Cane Creek Tributary Stream Restoration Site
Monitoring Report MY04
Basin 03010104
EEP Project ID # 92325
Contract # D06002

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February 2013

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EXECUTIVE SUMMARY

The Cane Creek Tributary Site (CCTS) is located in the Piedmont physiographic province in northwestern Person County, North Carolina. The project will provide mitigation for stream impacts within the 8-digit hydrologic cataloging unit 03010104 in the Roanoke River Basin by restoring, enhancing, and preserving 19,059 linear feet on the CCTS, generating 14,621 stream mitigation units (SMU's.) The goals of the project include restoring the stream's riparian buffer and creating a stable stream system. In order to reach these goals, the project objectives included planting a functional Piedmont Alluvial Forest floodplain community along with Mesic Mixed Hardwood Forest to create an effective riparian buffer, removing cattle from the riparian areas with fencing, removing relic spoil piles that disrupt overland flowpaths, stopping bank erosion by developing the appropriate channel dimension, arresting bed elevation lowering, and stabilizing seep outlets.

The western portion of the project drains to the southeast and has a contributing drainage area of approximately 0.70 square mile. The eastern portion of the project also drains towards the southeast with a contributing drainage area of approximately 0.62 square mile. Each half of the project is made up of a series of headwater and first-order streams. Both sides of the project drain to Cane Creek downstream of the site. The project watershed is rural and faces low development pressure from the surrounding area. The stream design and the restoration plan were completed in December 2007, construction began in May 2008, and the site was planted in December 2008.

The site was planted with bare root trees, shrubs, and live stakes. A total of 17 different species were planted at the site. Twenty vegetation monitoring plots were established during the as-built survey. Riparian vegetation must meet a minimum survival success rate of 260 stems/acre after five years. The plots were monitored following the CVS-EEP monitoring Level 2 protocol and the fourth-year monitoring counted an average of 378 planted stems/acre and 5,198 total stems/acre, including volunteers. There are some plots with low planted stem densities, including five plots with planted stem densities below 260 stems/acre: plots 5, 8, 13, 17, and 18. When including volunteers in these four plots, all plots are above the 260 total stems/acre density. Supplemental planting was conducted at the site during the 2010/2011 dormant season. Additional supplemental planting may be conducted in the future if it is deemed necessary. Considering the plentiful volunteers and overall vegetative condition of the site, the fourth-year monitoring found the vegetation component of the project to be on track to meeting the success criterion.

The stream restoration included thirty-four separate reaches, which have been enhanced and restored based on a combination of Priority 2 and 3 approaches. Rock cross vanes, step pools, and riffle grade controls were used to control grade throughout the profile. The streams were restored to B4, B4/1, B4c, B4/1c, Bc/C4, C/B4, and C/E4 stream types. In addition to the restored and enhanced reaches, there are nine preservation reaches. These reaches are intermittent headwater streams that were identified as project assets during the as-built stage. The fourth year of monitoring found the majority of the project to be functioning as designed. Isolated areas of bank erosion and streambed degradation have been noted at the site, but there are no systematic problems that indicate that the project streams are unstable or becoming so. In 2012, there were two bankfull events at the site. The project is on track to meeting the success criterion of at least two bankfull events in five years with each occurring in different years.

The site will continue to be monitored through 2013 or until the success criteria are achieved. Reports will be submitted to the EEP each year. The planted riparian buffer must meet the success criteria of 260 planted stems/acre at the end of the monitoring period. Stream success will be assessed utilizing measurements of stream dimension, pattern, and profile as well as through site photographs.

1.0 PROJECT BACKGROUND

1.1 Location and Setting

The Cane Creek Tributary Site (CCTS) is spread over two separate drainage areas on two parcels under the same ownership. The site is located off of Cunningham Road in northwestern Person County, North Carolina. Specifically, the site is approximately 0.85 mile east of the intersection of Cunningham Road and NC 119 (Figure 1). The project is centered at approximately 36.5038 degrees north and 79.1310 degrees west (WGS84). To reach the site from Raleigh, proceed west on US-70 until it merges with I-85/US-15 south. Continue on I-85 for approximately 1.5 miles and then take exit 176B for Duke St/US-501 Bypass. Take a right off of the exit and travel on US-501 for 27.5 miles. Within the town of Roxboro, turn left onto Court St/US-158 west. Follow US-158 west 0.4 mile and turn right onto NC-57, continuing northwest for another 12.3 miles. Once within the small community of Semora, turn right onto NC-119 and drive north 0.5 mile. Turn right onto Cunningham Road and continue east for 0.85 mile. The CCTS is accessible through a metal gate on the right.

1.2 Project Goals and Objectives

The goals and objectives of the project are as follows:

Project Goals:
- Restore the stream's riparian buffer.
- Create a stable network of headwater streams.

Project Objectives:
- Plant a functional Piedmont Alluvial Forest floodplain community along with a Mesic Mixed Hardwood Forest to create an effective riparian buffer.
- Arrest bed elevation lowering and stabilize seep outlets.
- Stop bank erosion by developing the appropriate channel dimension and stabilizing with vegetation.
- Remove relic spoil piles that disrupt overland flowpaths.
- Exclude livestock from the riparian areas with fencing.

1.3 Project Structure, Restoration Type and Approach

The project streams had become degraded primarily through poor grazing management and vegetation removal. Historically, the two parcels were cleared and converted into pasture except for narrow strips of riparian vegetation along the streams and intact forest in the southern portion of the western parcel. Prior to restoration, many of the project streams were experiencing severe bank erosion. Severe bed degradation was also evident throughout the different project reaches. All of the reaches exhibited areas of vertical instability. Restoration, enhancement, and preservation of 19,059 linear feet of channel were accomplished utilizing a combination of Priority 2 and 3 approaches (Table 1). Reaches T1-T6 are on the western side of the project and reaches T7-T10 are on the eastern side.

All of T1 was built as a B4c channel with small sections of C channel in those areas without constrictive valley walls. T1 has been divided into five different reaches to reflect changes in drainage area and the type of mitigation. T1-1 runs from Station 10+00 to 17+64 and stops at the confluence with T3. A second reach, T1-2, goes from this confluence with T3 at Station 17+64 until Station 21+50. Both T1-1 and T1-2 were enhanced by grading back the existing eroding banks, building a bankfull bench, and developing distinct riffles and pools (Enhancement I).

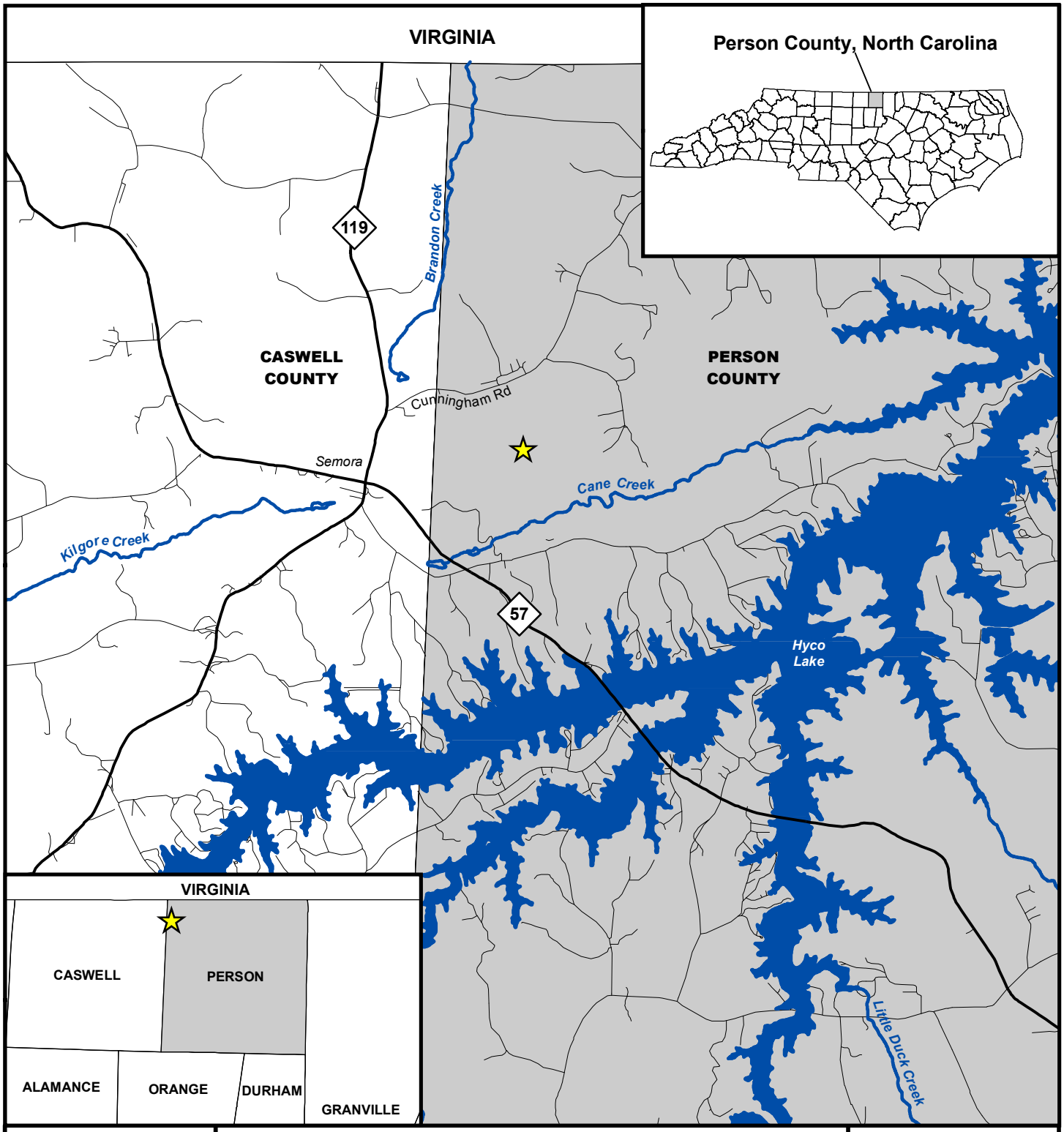

Figure 1. Vicinity Map

- Project Site Location
- Major Roads
- Other Roads
- Major Streams and Rivers
- Major Lakes and Reservoirs
- County Boundaries

N
W E
S

1:63,360
1 inch equals 1 miles

1 0.5 0 1 Miles

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Environmental Technologies and Construction, Inc.

T1 was restored from Station 21+50 until it ends at the property boundary. There are three separate reaches in this section of T1: T1-3 from Station 21+50 to 24+76 where T4 enters; T1-4 from Station 24+76 to 34+85 where T6 flows into T1, and T1-5 from Station 34+85 to 37+67. These three lower reaches of T1 were restored using a Priority 3 approach. Along this section of T1, the restoration established riffle and pool features and a new stable planform, while also utilizing existing bedrock as grade control.

T2, a B4 stream, was divided into four separate reaches. T2-1 begins at Station 50+00 and ends at Station 53+05. This reach was improved by fencing out the livestock, removing adjacent relic spoil piles to restore natural drainage to the stream, and planting the riparian buffer with native vegetation (Enhancement II). Beginning at Station 53+05 and ending at Station 55+00, T2-2 was restored using a Priority 3 approach. This reach was relocated away from a severely eroding valley wall and reconnected to the existing stream at Station 55+00. The next reach, T2-3, was enhanced by sloping back the existing eroding banks, building a bankfull bench, removing the adjacent relic spoil piles, and developing distinct riffles and pools (Enhancement I). T2-4 begins at Station 56+50, and was restored using a Priority 3 approach. This bottom section of T2 connects to T1 at Station 58+50 with a new stable pattern, dimension, and profile.

T3 is the next tributary to join T1, and is divided into two different reaches. T3-1 is a short headwater reach that runs from Stations 60+00 to 60+85 and was enhanced by shaping the existing eroding banks and defining distinct riffles and pools (Enhancement I). T3-2 was restored with dimension, profile, and pattern adjustments using a Priority 3 approach, and runs from Station 60+85 to its confluence with T1 at Station 76+97.

Similar to T3, T4 also flows into T1 and has been separated into two reaches. The entire length of T4 was restored as a B4 channel. T4-1 and T4-2 run from Station 80+00 to Station 82+53 and Station 82+53 to Station 102+81, respectively. These two reaches, which are distinguished by differences in slope, were restored with dimension, profile, and pattern adjustments using a Priority 3 approach.

T5 has two reaches and both are B4 channels. T5-1 runs from Stations 110+00 to 112+64 and was enhanced by fencing out the livestock and planting the riparian buffer with native vegetation (Enhancement II). T5-2, which goes from Station 112+64 to Station 113+95 at its confluence with T1, was restored with dimension, profile, and pattern adjustments using a Priority 3 approach.

T6 and its headwater tributaries consist of B4 channels. At the top of this headwater system, there are four intermittent headwater reaches. These reaches, T6B-1 (Stations 248+38 to 250+00), T6C-1 (Stations 117+02 to 120+00), T6C-2 (Stations 300+00 to 300+80), and T6C-3 (Stations 310+00 to 310+82) are stable streams surrounded by an established vegetated buffer and were therefore preserved. Two perennial headwater reaches, T6A (Stations 240+00 to 240+90) and T6B (Stations 250+00 to 251+04), were improved with bank and seep stabilization (Enhancement II). These two reaches come together to form T6AB from Station 240+90 to 241+21. T6C, from Station 120+00 to 121+75 at its confluence with T6AB, is another headwater tributary. T6 begins at Station 121+75, the confluence of T6AB and T6C, and ends at Station 134+25, where it meets T1. T6AB, T6C, and T6 were all restored using a Priority 3 approach with dimension, profile, and pattern adjustments.

On the eastern side of the property, T7 was divided into ten different design reaches. The headwaters of T7 include two preservation reaches. These two reaches, T7A-1 (Stations 259+38 to 260+00) and T7B (Stations 320+00 to 321+25), are both stable channels bordered by a riparian buffer. T7-1 begins at Station 140+00 and continues until Station 145+25. It is a B4/C4 stream

type that was improved with isolated bank stabilization, seep stabilization at the beginning of the reach, fencing out the livestock, and planting the riparian buffer with native vegetation (Enhancement II). T7A (Stations 260+00 to 261+36) and T7C (Stations 330+00 to 330+42) are similar to T7-1 and were also improved as a B4/C4 channel with the same Enhancement II methods. T7-2 (Stations 145+25 to 148+57) was improved to a B4 stream type by sloping back the existing eroding banks and enhancing the existing riffle and pool features (Enhancement I).

T7-3 begins at Station 148+57 where T7-2 and T8 join together. T7-3 was restored as a B4c channel using Priority 2 and 3 approaches with dimension, profile, and pattern adjustments. T7-4 begins at Station 169+86 where the stream enters a more confined valley with numerous bedrock features. The B4/1 channel was improved by building an appropriate stream dimension and enhancing distinct riffle and pool features that had been degraded by cattle and excess sediment inputs (Enhancement I).

T7-5 is a short B4 reach that was restored with dimension, profile, and pattern adjustments from Station 182+28 to 183+75 using a Priority 3 approach. From Station 183+75 to Station 191+59, T7-6 has frequent bedrock in the streambed and was improved by building an appropriate stream dimension and developing distinct riffle and pool features (Enhancement I), creating a B4/1 stream type. T7-7 begins at the confluence with T10 and continues until the stream enters Cane Creek at Station 198+13. This final reach along T7 was also modified as Enhancement I by building an appropriate stream dimension and creating distinct riffle and pool features.

There are three intermittent preservation reaches on the headwater system of T8. These include T8-1 (Stations 199+06 to 200+00), T8B (Stations 340+00 to 340+59), and T8A-1 (Stations 269+75 to 270+00), which are all stable streams with established riparian buffers. The remaining headwater reaches of T8 (Stations 200+00 to 204+38) and T8A (Stations 270+00 to 271+23) were improved using Enhancement I (building an appropriate stream dimension and creating distinct riffle and pool features) and Enhancement II (isolated bank stabilization, seep stabilization at the beginning of the reach, fencing out the livestock, and planting the riparian buffer with native vegetation), respectively. Both reaches are B4 stream types. T9 (Stations 210+00 to 213+68) is a similar headwater reach to T8 and received the same Enhancement I improvements as T8.

T10 runs along the eastern edge of the site and has been divided into two separate reaches. T10-1 is the longer reach and goes from Stations 220+00 to 233+00. T10-1 is a B4/1 channel and was improved with isolated bank stabilization, livestock exclusion, and riparian buffer plantings (Enhancement II). T10-2 begins at 233+00 and continues a short distance until the confluence with T7 at Station 235+94. This reach was improved using Enhancement I (building an appropriate stream dimension and creating distinct riffle and pool features) of the B4/1 channel.

Table 1 below provides the linear footage for existing and as-built stream length as well as the total stream mitigation units by reach. For this table, the existing linear footage was calculated from the existing stream centerline. In some instances, the linear footage is less for the as-built conditions than for the existing conditions. This situation can arise when the design changes the exact location of tributary confluences. In other locations, the pattern of the existing stream had an unstable meandering centerline that may have been influenced by debris blockages and cattle damage to the stream. In the as-built stream, the pattern is stable and more clearly defined, but the actual length may be shorter than the pre-restoration conditions. Some of these lengths are also slightly different than the designed lengths. On the restored reaches, this is due to occasional field changes to the pattern during construction. For the enhancement reaches, this is generally a result of the as-built survey being more detailed, and picking up a more accurate depiction of the pattern than was recorded in the existing conditions topographic survey.

1.4 Project History, Background, and Contact Information

Table 1. Project Restoration Components
Cane Creek Stream Restoration Site

Project Segment / Reach ID	Pre-Project Footage	Mitigation Type	Approach	As-Built Footage	As-Built Stationing	Stream Mitigation Units*	Comment
T1-1 and T1-2	1,087	Enhancement I	-	1,150	10+00-21+50	725 SMU*	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created around the existing bedrock, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T1-3, T1-4 and T1-5	1,688	Restoration	P3	1,617	21+50-37+67	1,617 SMU	Stable riffles and pools were established along a realigned stream planform, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T2-1	305	Enhancement II	-	305	50+00-53+05	122 SMU	Isolated eroding banks were graded to a stable slope, relic spoil piles adjacent to the stream were removed, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T2-2	227	Restoration	P2	195	53+05-55+00	195 SMU	The stream was realigned away from an unstable valley wall, relic spoil piles adjacent to the stream were removed, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T2-3	160	Enhancement I	-	150	55+00-56+50	100 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created, relic spoil piles adjacent to the stream were removed, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T2-4	151	Restoration	P3	200	56+50-58+50	180 SMU*	New riffles and pools were established along a new stream planform, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T3-1	107	Enhancement I	-	85	60+00-60+85	57 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created, the unvegetated portions of the buffer were planted, cattle exclusion fencing was erected along the easement, and entering seeps were stabilized.
T3-2	1,457	Restoration	P3	1,612	60+85-76+97	1,592 SMU*	Stable riffles and pools were established along a realigned stream planform, relic spoil piles adjacent to the stream were removed, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T4-1 and T4-2	1,979	Restoration	P3	2,281	80+00-102+81	2,261 SMU*	Stable riffles and pools were established along a realigned stream planform, relic spoil piles adjacent to the stream were removed, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T5-1	244	Enhancement II	-	264	110+00-112+64	97 SMU*	The unvegetated portions of the buffer were planted and cattle exclusion fencing was erected along the easement.
T5-2	118	Restoration	P3	132	112+64-113+95	132 SMU	Stable riffles and pools were established along a realigned stream planform creating a stable confluence with T1, the buffer was planted, and cattle exclusion fencing was erected along the easement.
			Total	7,991		7,078 SMU*	

P2 = Priority 2 P3 = Priority 3 * These SMUs have been calculated by excluding the easement exceptions, which include ford crossings for the landowner.

Table 1. Project Restoration Components, continued
Cane Creek Stream Restoration Site

Project Segment / Reach ID	Pre-Project Footage	Mitigation Type	Approach	As-Built Footage	As-Built Stationing	Stream Mitigation Units*	Comment
T6A	89	Enhancement II	-	90	240+00-240+90	36 SMU	Isolated eroding banks were graded to a stable slope, the seep where the stream originates was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T6B-1	162	Preservation	-	162	248+38-250+00	32 SMU	Installed cattle exclusion fencing along the easement.
T6B	103	Enhancement II	-	104	250+00-251+04	42 SMU	Isolated eroding banks were graded to a stable slope, the seep where the stream originates was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T6AB	30	Restoration	P3	31	240+90-241+21	31 SMU	Grade control structures were used to stabilize the bed and maintain pools, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T6C-1	297	Preservation	-	297	117+02-120+00	59 SMU	Installed cattle exclusion fencing along the easement.
T6C-2	80	Preservation	-	80	300+00-300+80	16 SMU	Installed cattle exclusion fencing along the easement.
T6C-3	82	Preservation	-	82	310+00-310+82	16 SMU	Installed cattle exclusion fencing along the easement.
T6C and T6	1,455	Restoration	P3	1,425	120+00-134+25	1,405 SMU*	New riffles and pools were established along a new stream planform, the headcut at the top of T6C was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T7A-1	62	Preservation	-	62	259+38-260+00	12 SMU	Installed cattle exclusion fencing along the easement.
T7A	136	Enhancement II	-	136	260+00-261+36	54 SMU	Isolated eroding banks were graded to a stable slope, a seep at the beginning of the reach was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T7B	125	Preservation	-	125	320+00-321+25	25 SMU	Installed cattle exclusion fencing along the easement.
T7C	42	Enhancement II	-	42	330+00-330+42	17 SMU	Removed a well house at the head of the reach, stabilized the seep, graded the banks to a stable slope, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T7-1	469	Enhancement II	-	525	140+00-145+25	210 SMU	Isolated eroding banks were graded to a stable slope, the seep where the stream originates was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T7-2	331	Enhancement I	-	332	145+25-148+57	221 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created around the existing bedrock, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T7-3	2,023	Restoration	P2/3	2,129	148+57-169+86	2,109 SMU*	New riffle and pool sequences were established along a realigned stream planform, the buffer was planted, and cattle exclusion fencing was erected along the easement.
			Total	5,622		4,285 SMU*	

P3 = Priority 3 P2/P3 = Combination of Priorities 2 and 3

* These SMUs have been calculated by excluding the easement exceptions, which include ford crossings for the landowner.

Table 1. Project Restoration Components, continued
Cane Creek Stream Restoration Site

Project Segment / Reach ID	Pre-Project Footage	Mitigation Type	Approach	As-Built Footage	As-Built Stationing	Stream Mitigation Units*	Comment
T7-4	1,246	Enhancement I	-	1,242	169+86-182+28	828 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, overwidened portions of stream were built to the appropriate cross-sectional area, distinct riffles and pools were created around the existing bedrock, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T7-5	185	Restoration	P3	147	182+28-183+75	147 SMU	The stream was realigned away from an unstable valley wall, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T7-6 and T7-7	1,365	Enhancement I	-	1,438	183+75-198+13	945 SMU*	Eroding banks were graded to a stable slope, bankfull benches were built, overwidened portions of stream were built to the appropriate cross-sectional area, distinct riffles and pools were created around the existing bedrock, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T8A-1	25	Preservation	-	25	269+75-300+00	5 SMU	Installed cattle exclusion fencing along the easement.
T8A	110	Enhancement II	-	123	270+00-271+23	49 SMU	Isolated eroding banks were graded to a stable slope, a seep at the beginning of the reach was stabilized, a log structure was added for grade control, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T8B	59	Preservation	-	59	340+00-340+59	12 SMU	Installed cattle exclusion fencing along the easement.
T8-1	94	Preservation	-	94	199+06-200+00	19 SMU	Installed cattle exclusion fencing along the easement.
T8	449	Enhancement I	-	438	200+00-204+38	292 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created with instream structures, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T9	369	Enhancement I	-	368	210+00-213+68	245 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created with instream log structures, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T10-1	1,300	Enhancement II	-	1,300	220+00-233+00	520 SMU	Isolated eroding banks were graded to a stable slope, an eroding drainage swale was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T10-2	282	Enhancement I	-	294	233+00-235+94	196 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created with instream structures, the buffer was planted, and cattle exclusion fencing was erected along the easement.
			Total	5,528		3,258 SMU*	
			Preservation Total	986		196 SMU*	
			Enhancement II Total	2,889		1,147 SMU*	
			Enhancement I Total	5,497		3,609 SMU*	
			Restoration Total	9,769		9,669 SMU*	
			Total of All Reaches	19,141		14,621 SMU*	

P3 = Priority 3 * These SMUs have been calculated by excluding the easement exceptions, which include ford crossings for the landowner

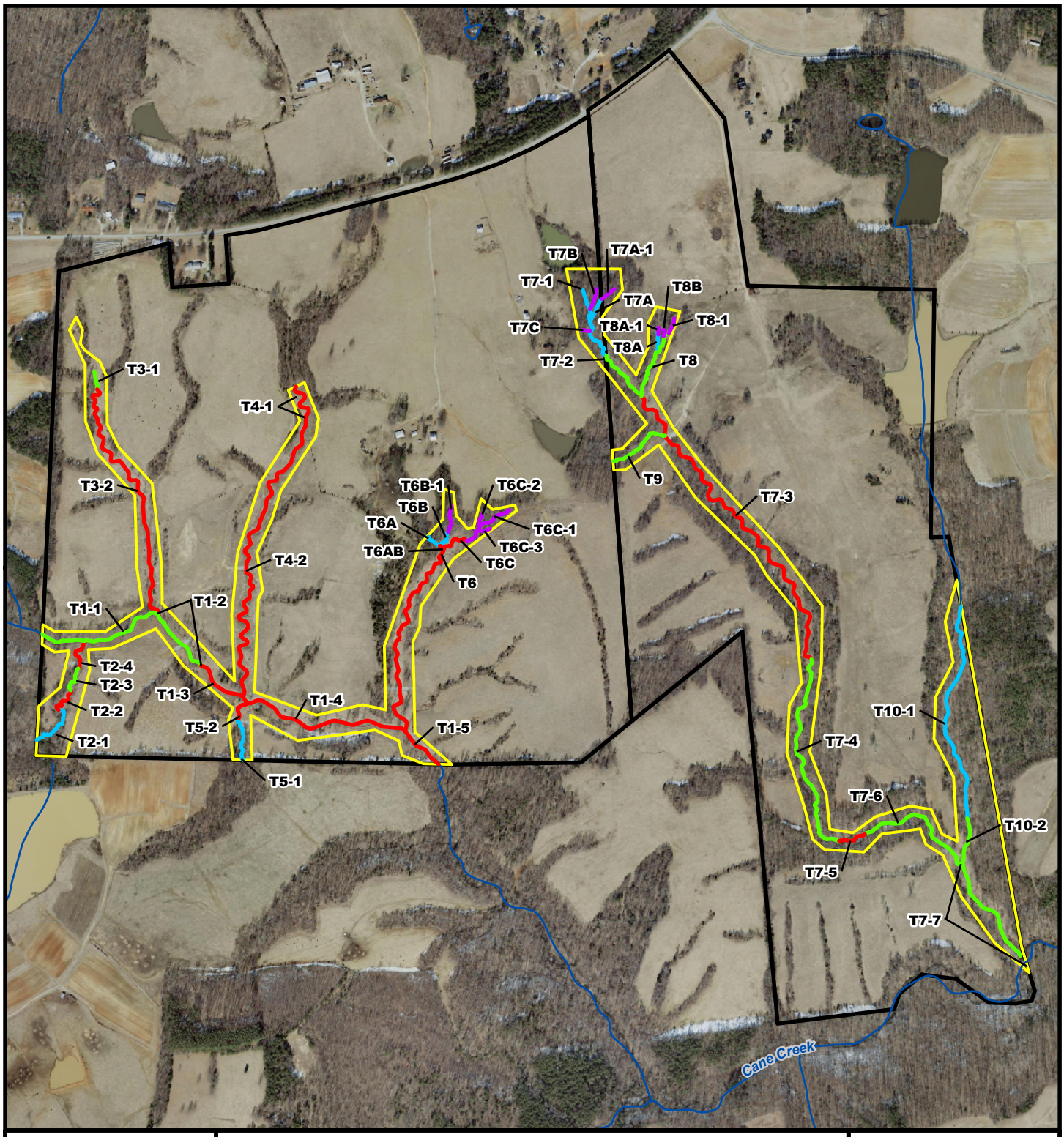

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Figure 2. As-Built Site Plan

Preservation Reach
Enhancement I Reach
Enhancement II Reach
Restoration Reach
Project Easement
Other Streams
Project Parcel Boundaries

N
W E
S

1:9,600
1 inch = 800 feet

800 400 0 800
Feet

Image Source: NC Statewide Orthoimagery, 2010.

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Table 2. Project Activity and Reporting History Cane Creek Stream Restoration Site		
Activity or Report	**Data Collection Complete**	**Completion or Delivery**
Restoration Plan	2007	Dec 07
Final Design	2007	Dec 07
Construction	N/A	Dec 08
Planting - Stream	N/A	Dec 08
Mitigation Plan / As-Built (Year 0 Monitoring - Baseline)	Jan 09	May 09
Monitoring Year 01	Dec 09	Dec 09
Monitoring Year 02	Jan 11	Jan 11
Monitoring Year 03	Nov 11	Jan 12
Monitoring Year 04	Jul 12	Dec 12

Table 3. Project Contact Table Cane Creek Stream Restoration Site	
Design Firm	KCI Technologies, Inc. Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Gary Mryncza Phone: (919) 783-9214 Fax: (919) 783-9266
Construction Contractors	Environmental Technologies and Construction Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Ryan McDavitt Phone: (919) 278-2518 Fax: (919) 783-9266
	Quartermaster Environmental P.O. Drawer 400 Shelby, NC 28150 Contact: Mr. Brooks Cole Phone: (704) 473-5021
Planting Contractor	Bruton Nurseries & Landscapes 150 Black Creek Rd. Fremont, NC 27830 Contact: Charles Bruton Phone: (919) 242-6555
Monitoring Performers	
MY-00 - MY-05	KCI Technologies, Inc. Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266

Table 4. Project Background Table **Cane Creek Stream Restoration Site**	
Project County	Person County
Physiographic Region	Piedmont
Ecoregion	Northern Inner Piedmont
Project River Basin	Roanoke
USGS HUC for Project and Reference	03010104061040 (UT to Cane Creek)
	03040101090010 (UT Fisher River - reference)
NCDWQ Sub-basin for Project and Reference	03-02-05 (UT to Cane Creek)
	03-07-02 (UT Fisher River - reference)
Drainage Area	1.32 sq. mi.
Stream Order	First, Second, and Third Order
Watershed Type (Rural, Urban, Developing, etc.)	Rural
Watershed LULC Distribution Urban	<1%
Ag-Row Crop	49%
Ag-Livestock	12%
Forested	35%
Water/Wetlands	1%
Watershed impervious cover (%)	<1%
Rosgen Classification of As-built (Stream)	B4 (T2-3, T2-4, T3-2, T4-1, T4-2, T5-2, T6, T6c,
	T7-2, T8, T9)
	B4/1 (T7-4, T7-6, T10-2)
	B4c (T7-3)
	B4c/1 (T7-7)
	B4c/C4 (T7-5)
	C/B4 (T1)
	C/E4 (T3-1)
	C/E4 (T2-2)
NCDWQ Classification for Project	Class C (Cane Creek)
Within EEP Watershed Plan?	No
Any portion of the project segment upstream of a 303d listed segment?	No
Reasons for 303d Listing or Stressor	N/A
Total project acreage of easement	52.1 Acres
Total planted acreage	32.4 Acres
WRC Class (Warm, Cool, Cold)	Warm
Species of concern, endangered etc.	None
Pre-construction Beaver activity?	No
Dominant Soil Types	Chewacla, Wehadkee, Wilkes, and Wedowee
% of Project Easement Fenced	100%

2.0 PROJECT CONDITIONS AND MONITORING RESULTS

2.1 Vegetation Assessment

The planted vegetation on the site is growing well. Due to the baseline vegetation monitoring occurring while the plants had not yet leafed out, some of the plants could not be identified initially and they were recorded as unknown. Since the baseline monitoring most of these plants were identified. Some of the previously unknown plants were dead, damaged, or missing and could still not be identified. These plants were again recorded as unknown.

The bankfull bench, stream banks, and riparian buffer have isolated areas with sparse vegetation, but overall they are well vegetated. Additional permanent seed was applied to areas of bare soil in 2011. Some scattered populations of invasive species have been identified at the site. These include Chinese privet (*Ligustrum sinense*), multiflora rose (*Rosa multiflora*), tree-of-heaven (*Ailanthus altissima*), and princess tree (*Paulownia tomentosa*). Most of the invasive species are in areas where the existing vegetation was left intact. These populations will continue to be monitored.

KCI used the Level 2 CVS-EEP vegetation monitoring protocol to quantify the number of planted stems and volunteer woody stems during Monitoring Year 4. The monitored vegetation plots revealed an average density of 378 planted stems/acre and 5,198 total stems/acre when including volunteers. There are five monitoring plots (Plots 5, 8, 13, 17, and 18) that had calculated planted stem densities less than 260 stems/acre. This is not seen as problematic given the high potential for desirable volunteers to become established in the plots and across the site. Like natural vegetative communities, some areas will have slightly higher densities than others, but the data from the vegetation monitoring plots reveal that the site has an adequate average stem density. In the fifth year of monitoring KCI will continue to use the Level 2 CVS-EEP vegetation monitoring protocol to quantify the number of volunteer woody stems. Supplemental planting was conducted at the site during the 2010/2011 dormant season. Additional supplemental planting may be conducted in the future if it is deemed necessary. Considering the plentiful volunteers and overall vegetative condition of the site, the fourth-year monitoring found the vegetation component of the project to be on track to meeting the success criterion. The vegetative monitoring results are displayed in Appendix A.

2.2 Stream Assessment

During the 2012 growing season, the project streams have been functioning as designed. There are isolated areas of erosion on the streambanks and the side slopes, which have been noted on the CCPV. In 2012, maintenance was conducted to stabilize most of the areas of slope erosion. The on-site stream gauge recorded two bankfull events in 2012.

The stream assessment found the stream to be stable overall. There are some cross-sections that show stream degradation since the previous monitoring year, but the profiles do not show systematic degradation so these areas are isolated and not indicative of instability across the reaches. It is also important to note that all of the streams across the site have grade control from in-stream structures, and in some instances significant bedrock. Additional visual monitoring and future surveying will determine if corrective actions are needed in these isolated erosion areas.

2.2.1 Bankfull Events

Table 5. Verification of Bankfull Events			
Cane Creek Stream Restoration Site			
Date of Data Collection	**Date of Occurrences**	**Method**	**Photo Number**
8/4/2009	5/28/2009	Stream Gauge	N/A
8/4/2009	6/5/2009	Stream Gauge	N/A
10/13/2009	9/21/2009	Stream Gauge	N/A
10/13/2009	9/28/2009	Stream Gauge	N/A
10/13/2009	10/9/2009	Stream Gauge	N/A
7/22/2010	3/22/2010	Stream Gauge	N/A
7/22/2010	5/28/2010	Stream Gauge	N/A
5/27/2011	4/16/2011	Stream Gauge	N/A
7/25/2012	7/14/2012	Stream Gauge	N/A
7/25/2012	7/22/2012	Stream Gauge	N/A

2.2.2 Quantitative Measures Summary Tables

Table 6a. T1-3 Baseline Stream Summary
Cane Creek Stream Restoration Site

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built*			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)			10.2		1	9.0	9.5		10.0	2	13.6					
Floodprone Width (ft)			25.4		1	13	17		20	2	30					
Bankfull Mean Depth (ft)			1.3		1	1.1	1.2		1.2	2	1.2					
Bankfull Max Depth (ft)			1.9		1	1.3	1.4		1.5	2	1.9					
Bankfull Cross-Sectional Area (ft^2)			12.9		1	10.4	10.6		10.7	2	16.4					
Width/Depth Ratio			8.1		1	8.0	9.0		10.0	2	11.0					
Entrenchment Ratio			2.5		1	1.3	1.8		2.3	2	2.2					
Bank Height Ratio			1.8		1			1.0		2	1.0					
Pattern																
Channel Beltwidth (ft)			21					45			40	70	40	54	70	3
Radius of Curvature (ft)	7			19		13			42		30	40	30	35	40	4
Rc:Bankfull width (ft/ft)	0.7			1.9		1.3			4.4		2.2	3.0				
Meander Wavelength (ft)	90			117		93			136		160	170	160		170	2
Meander Width Ratio			2.0			4.5			5.0		3.0	5.0				
Profile																
Riffle Length (ft)													8	49	86	7
Riffle Slope (ft/ft)	0.0138			0.0427		0.013			0.028		0.010	0.014	0.006	0.012	0.030	7
Pool Length (ft)	13			38		3			25		10	20	16	19	26	6
Pool Spacing (ft)	21			49		30			59		75	100	56	94	152	5
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 13% / 87% / 0% / 0% / 0%					0% / 15% / 78% / 7% / 0% / 0%							0% / 34% / 66% / 0% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	6.0 / 9.0 / 11 / 21 / 30					2.0 / 4.2 / 6.9 / 30 / 70							0.6 / 2.1 / 4.5 / 15 / 28			
Additional Reach Parameters																
Channel length (ft)	313					297					324		326			
Drainage Area (SM)	0.60					0.38					0.60		0.60			
Rosgen Classification	E4					B4c					C/B4		C/B4			
Sinuosity	1.10					1.20					1.10		1.10			
Water Surface Slope (ft/ft)	0.0070					0.0130					0.0089		0.0089			

* This is a short restoration reach, similar to T1-4 and T1-5, and does not have any monitored cross-sections. Therefore there is no as-built dimension data.

Table 6b. T1-4/T1-5 Baseline Stream Summary
Cane Creek Stream Restoration Site

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	10.5	14.1	14.5	17.0	4	9.0	9.5		10.0	2	15.0		15.3	16.4	17.4	2
Floodprone Width (ft)	19	24	20	35	4	13	17		20	1	33		39	41	42	2
Bankfull Mean Depth (ft)	1.0	1.3	1.3	1.5	4	1.1	1.2		1.2	2	1.3		1.1	1.3	1.5	2
Bankfull Max Depth (ft)	1.2	1.8	1.8	2.3	4	1.3	1.4		1.5	2	2.0		1.9	2.0	2.1	2
Bankfull Cross-Sectional Area (ft^2)	15.3	17.3	16.8	20.1	4	10.4	10.6		10.7	2	20.0		18.9	20.6	22.2	2
Width/Depth Ratio	7.2	11.8	11.4	17.2	4	8.0	9.0		10.0	2	12.0		10.5	13.3	16.0	2
Entrenchment Ratio	1.2	1.8	1.4	3.3	4	1.3	1.8		2.3	1	2.2		2.2	2.5	2.7	2
Bank Height Ratio	1.4	2.0	2.1	2.3	4			1.0		2	1.0		1.0	1.0	1.0	2
Pattern																
Channel Beltwidth (ft)	25			51				45			25	60	25		60	
Radius of Curvature (ft)	12			64		13			42		30	50	30	36	50	14
Rc:Bankfull width (ft/ft)	0.7			5.1		1.3			4.4		2.0	3.3	1.8	2.2	3.0	
Meander Wavelength (ft)	106			230		93			136		115	240	115		240	
Meander Width Ratio	1.5			4.7		4.5			5.0		1.7	4.0	1.5		3.7	
Profile																
Riffle Length (ft)													8	49	86	7
Riffle Slope (ft/ft)	0.0110			0.0407		0.013			0.028		0.005	0.013	0.006	0.012	0.030	7
Pool Length (ft)	11			30		3			25		10	30	16	19	26	6
Pool Spacing (ft)	29			88		30			59		50	150	56	94	152	5
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 17% / 63% / 19% / 0% / 0%					0% / 15% / 78% / 7% / 0% / 0%							0% / 7% / 86% / 4% / 0% / 3%			
d16 / d35 / d50 / d84 / d95 (mm)	1.6 / 13 / 22 / 73 / 130					2.0 / 4.2 / 6.9 / 30 / 70							6.9 / 14 / 19 / 41 / 62			
Additional Reach Parameters																
Channel length (ft)	1,290					297					1,290		1,291			
Drainage Area (SM)	0.80					0.38					0.80		0.80			
Rosgen Classification	B/G/F					B4c					C/B4		C/B4			
Sinuosity	1.07 - 1.33					1.20					1.10		1.10			
Water Surface Slope (ft/ft)	0.0072 - 0.0090					0.0130					0.0080		0.0071			

Table 6c. T2-2 Baseline Stream Summary
Cane Creek Stream Restoration Site

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built*			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)			4.4		1	9.0	9.5		10.0	2	7.4			7.7		1
Floodprone Width (ft)			>40		1	13	17		20	2	19			21		1
Bankfull Mean Depth (ft)			0.8		1	1.1	1.2		1.2	2	0.8			0.7		1
Bankfull Max Depth (ft)			0.9		1	1.3	1.4		1.5	2	1.3			1.2		1
Bankfull Cross-Sectional Area (ft^2)			3.3		1	10.4	10.6		10.7	2	5.7			5.4		1
Width/Depth Ratio			5.9		1	8.0	9.0		10.0	2	9.3			11.0		1
Entrenchment Ratio			>10		1	1.3	1.8		2.3	2	2.5			2.7		1
Bank Height Ratio			1		1			1.0		2	1.0			1.0		1
Pattern																
Channel Beltwidth (ft)	11			19				45			14	23	14		23	
Radius of Curvature (ft)	5			18		13			42		7	10	7	10	10	6
Rc:Bankfull width (ft/ft)	1.1			4.1		1.3			4.4		1.0	1.4	1.0		1.3	
Meander Wavelength (ft)	39			61		93			136		40	53	40		53	
Meander Width Ratio	2.5			3.3		4.5			5.0		1.9	3.1	1.8		3.0	
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 33% / 66% / 1% / 0% / 0%					0% / 15% / 78% / 7% / 0% / 0%							0% / 23% / 76% / 1% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	0.5 / 2.5 / 5.0 / 31 / 48					2.0 / 4.2 / 6.9 / 30 / 70							1.3 / 4.5 / 10 / 30 / 44			
Additional Reach Parameters																
Channel length (ft)	227					297					186		195			
Drainage Area (SM)	0.11					0.38					0.11		0.11			
Rosgen Classification	E4					B4c					C/E4		C/E4			
Sinuosity	1.70					1.20					1.40		1.50			
Water Surface Slope (ft/ft)	0.0179					0.0130					0.0231					

* This is a short reach and does not have a monitored longitudinal profile.

Table 6d. T3-2 Baseline Stream Summary
Cane Creek Stream Restoration Site

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	3.4	5.8	5.2	10.9	6	9.0	9.5		10.0	2	7.8		7.8	8.1	8.3	2
Floodprone Width (ft)	6	27	8	78	6	13	17		20	2	16		21	23	24	2
Bankfull Mean Depth (ft)	0.5	0.7	0.8	0.9	6	1.1	1.2		1.2	2	0.7		0.5	0.5	0.5	2
Bankfull Max Depth (ft)	1.0	1.2	1.1	1.3	6	1.3	1.4		1.5	2	1.1		0.9	0.9	0.9	2
Bankfull Cross-Sectional Area (ft^2)	2.5	3.9	4.1	5.1	6	10.4	10.6		10.7	2	5.6		3.9	4.1	4.2	2
Width/Depth Ratio	4.3	9.2	7.0	23.3	6	8.0	9.0		10.0	2	10.9		15.6	16.0	16.4	2
Entrenchment Ratio	1.1	6.5	1.6	16.3	6	1.3	1.8		2.3	2	2.1		2.7	2.8	2.9	2
Bank Height Ratio	1.0	1.9	2.0	3.2	6			1.0		2	1.0		1.0	1.0	1.0	2
Pattern																
Channel Beltwidth (ft)	20			25				45			40	45	25		45	
Radius of Curvature (ft)	8			30		13			42		10	30	10		30	
Rc:Bankfull width (ft/ft)	1.4			7.1		1.3			4.4		1.3	3.8	1.2		3.7	
Meander Wavelength (ft)	80			420		93			136		48	130	45		130	
Meander Width Ratio	3.4			6.0		4.5			5.0		5.1	5.8	3.1		5.6	
.																
Riffle Length (ft)													7	23	56	11
Riffle Slope (ft/ft)	0.0102			0.0640		0.013			0.028		0.014	0.045	0.005	0.022	0.036	11
Pool Length (ft)	6			23		3			25		6	20	4	9	23	13
Pool Spacing (ft)	11			68		30			59		25	90	14	37	55	12
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 72% / 27% / 1% / 0% / 0%					0% / 15% / 78% / 7% / 0% / 0%							12% / 25% / 61% / 3% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	0.28 / 0.47 / 0.7 / 9 / 27					2.0 / 4.2 / 6.9 / 30 / 70							0.11 / 1.5 / 11 / 35 / 54			
Additional Reach Parameters																
Channel length (ft)	1,457					297					1,554		1,592			
Drainage Area (SM)	0.08					0.38					0.08		0.08			
Rosgen Classification	G4					B4c					B4		B4			
Sinuosity	1.10					1.20					1.20		1.20			
Water Surface Slope (ft/ft)	0.0202					0.0130					0.0215		0.0174			

Table 6e. T4-1 Baseline Stream Summary
Cane Creek Stream Restoration Site

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built*			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	4.5	5.4	5.1	6.7	3	9.0	9.5		10.0	2	6.2			8.5		1
Floodprone Width (ft)	6	8	8	10	3	13	17		20	2	12			24		1
Bankfull Mean Depth (ft)	1.1	1.2	1.1	1.4	3	1.1	1.2		1.2	2	0.5			0.5		1
Bankfull Max Depth (ft)	1.4	1.5	1.5	1.7	3	1.3	1.4		1.5	2	0.8			1.0		1
Bankfull Cross-Sectional Area (ft^2)	5.4	6.2	6.1	7.2	3	10.4	10.6		10.7	2	3.0			4.1		1
Width/Depth Ratio	3.3	4.8	4.8	6.2	3	8.0	9.0		10.0	2	12.4			17.6		1
Entrenchment Ratio	1.5	1.5	1.5	1.6	3	1.3	1.8		2.3	2	2.0			2.8		1
Bank Height Ratio	3.1	3.8	4.1	4.2	3			1.0		2	1.0			1.0		1
Pattern																
Channel Beltwidth (ft)	15			58				45			39	50	40		60	
Radius of Curvature (ft)	7			26		13			42		15	20	15	16	20	5
Rc:Bankfull width (ft/ft)	1.0			5.8		1.3			4.4		2.4	3.2	1.8	1.9	2.4	
Meander Wavelength (ft)	35			290		93			136		77	95	70		90	
Meander Width Ratio	2.2			12.9		4.5			5.0		6.3	8.1	4.7		7.1	
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 19% / 73% / 7% / 0% / 1%					0% / 15% / 78% / 7% / 0% / 0%							73% / 5% / 22% / 1% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	1.5 / 11 / 17 / 45 / 78					2.0 / 4.2 / 6.9 / 30 / 70							0.1 / 0.1 / 0.1 / 13 / 32			
Additional Reach Parameters																
Channel length (ft)	190					297					266		253			
Drainage Area (SM)	0.06					0.38					0.06		0.06			
Rosgen Classification	G4					B4c					B4		B4			
Sinuosity	1.70					1.20					1.40		1.40			
Water Surface Slope (ft/ft)	0.0179					0.0130					0.0231					

* The monitored longitudinal profile for T4 is on T4-2.

Table 6f. T4-2 Baseline Stream Summary
Cane Creek Stream Restoration Site

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	4.5	5.4	5.1	6.7	3	9.0	9.5		10.0	2	9.2		8.6	8.9	9.1	2
Floodprone Width (ft)	6	8	8	10	3	13	17		20	2	18		24	25	26	2
Bankfull Mean Depth (ft)	1.1	1.2	1.1	1.4	3	1.1	1.2		1.2	2	0.8		0.6	0.8	0.9	2
Bankfull Max Depth (ft)	1.4	1.5	1.5	1.7	3	1.3	1.4		1.5	2	1.2		1.2	1.5	1.7	2
Bankfull Cross-Sectional Area (ft^2)	5.4	6.2	6.1	7.2	3	10.4	10.6		10.7	2	7.1		5.9	6.9	7.9	2
Width/Depth Ratio	3.3	4.8	4.8	6.2	3	8.0	9.0		10.0	2	11.5		9.4	11.7	14.0	2
Entrenchment Ratio	1.5	1.5	1.5	1.6	3	1.3	1.8		2.3	2	2.0		2.6	2.8	3.0	2
Bank Height Ratio	3.1	3.8	4.1	4.2	3			1.0		2	1.0		1.0	1.0	1.0	2
Pattern																
Channel Beltwidth (ft)	15			58				45			25	60	20		65	
Radius of Curvature (ft)	7			26		13			42		10	30	10		30	
Rc:Bankfull width (ft/ft)	1.0			5.8		1.3			4.4		1.1	3.3	1.1		3.4	
Meander Wavelength (ft)	35			290		93			136		50	130	50		130	
Meander Width Ratio	2.2			12.9		4.5			5.0		2.7	6.5	2.2		7.3	
Profile																
Riffle Length (ft)													5	23	56	15
Riffle Slope (ft/ft)	0.0134			0.0381		0.013			0.028		0.009	0.030	0.005	0.025	0.063	15
Pool Length (ft)	10			35		3			25		5	40	1	11	28	19
Pool Spacing (ft)	20			80		30			59		30	85	7	46	94	18
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 19% / 73% / 7% / 0% / 1%					0% / 15% / 78% / 7% / 0% / 0%							1% / 47% / 51% / 1% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	1.5 / 11 / 17 / 45 / 78					2.0 / 4.2 / 6.9 / 30 / 70							0.4 / 1.1 / 2.4 / 30 / 52			
Additional Reach Parameters																
Channel length (ft)	1,789					297					1,967		2,008			
Drainage Area (SM)	0.10					0.38					0.10		0.10			
Rosgen Classification	G4					B4c					B4		B4			
Sinuosity	1.10					1.20					1.20		1.20			
Water Surface Slope (ft/ft)	0.0224					0.0130					0.0181		0.0141			

Table 6g. T5-2 Baseline Stream Summary

Cane Creek Stream Restoration Site

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built*			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)			3.3		1	9.0	9.5		10.0	2	5.0			5.9		1
Floodprone Width (ft)			4		1	13	17		20	2	10			21		1
Bankfull Mean Depth (ft)			0.7		1	1.1	1.2		1.2	2	0.5			0.4		1
Bankfull Max Depth (ft)			0.9		1	1.3	1.4		1.5	2	0.8			0.8		1
Bankfull Cross-Sectional Area (ft^2)			2.3		1	10.4	10.6		10.7	2	2.5			2.4		1
Width/Depth Ratio			4.7		1	8.0	9.0		10.0	2	10.0			14.5		1
Entrenchment Ratio			1.3		1	1.3	1.8		2.3	2	2.0			3.6		1
Bank Height Ratio			2.7		1			1.0		2	1.0			1.0		1
Pattern																
Channel Beltwidth (ft)								45			15	30	15		30	
Radius of Curvature (ft)						13			42		15		15			
Rc:Bankfull width (ft/ft)						1.3			4.4		3.0		2.5			
Meander Wavelength (ft)						93			136		45	63	50		60	
Meander Width Ratio						4.5			5.0		3.0	6.0	2.5		5.1	
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%						0% / 15% / 78% / 7% / 0% / 0%							40% / 41% / 20% / 0% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)						2.0 / 4.2 / 6.9 / 30 / 70							0.1 / 0.1 / 0.2 / 4.2 / 9.8			
Additional Reach Parameters																
Channel length (ft)	118					297					121		132			
Drainage Area (SM)	0.02					0.38					0.02		0.02			
Rosgen Classification	G4					B4c					B4		B4			
Sinuosity	1.10					1.20					1.20		1.20			
Water Surface Slope (ft/ft)	0.0590					0.0130					0.0550					

* This is a short reach and does not have a monitored longitudinal profile.

Table 6f. T6 Baseline Stream Summary
Cane Creek Stream Restoration Site

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	3.4	4.4		5.3	2	9.0	9.5		10.0	2	8.0		6.3	6.7	7.1	2
Floodprone Width (ft)	4	6		8	2	13	17		20	2	16		16.7	17.2	18.6	2
Bankfull Mean Depth (ft)	0.4	0.6		0.8	2	1.1	1.2		1.2	2	0.7		0.5	0.6	0.6	2
Bankfull Max Depth (ft)	0.5	0.8		1.0	2	1.3	1.4		1.5	2	1.1		0.8	0.9	0.9	2
Bankfull Cross-Sectional Area (ft^2)	1.3	2.7		4.0	2	10.4	10.6		10.7	2	5.7		3.4	3.5	3.6	2
Width/Depth Ratio	7.0	7.9		8.7	2	8.0	9.0		10.0	2	11.4		11.0	12.9	14.8	2
Entrenchment Ratio	1.1	1.3		1.5	2	1.3	1.8		2.3	2	2.0		2.6	2.7	2.7	2
Bank Height Ratio	3.0	4.9		6.8	2			1.0		2	1.0		1.0	1.0	1.0	2
Pattern																
Channel Beltwidth (ft)	16			36				45			36	40	30		40	
Radius of Curvature (ft)	3			16		13			42		10	35	10		35	
Rc:Bankfull width (ft/ft)	0.6			4.7		1.3			4.4		1.3	4.4	1.5		5.2	
Meander Wavelength (ft)	14			116		93			136		72	120	50		120	
Meander Width Ratio	2.6			34.1		4.5			5.0		4.5	5.0	4.5		6.0	
Profile																
Riffle Length (ft)													11	25	49	12
Riffle Slope (ft/ft)	0.009			0.030		0.013			0.028		0.013	0.025	0.010	0.024	0.040	12
Pool Length (ft)	9			13		3			25		6	15	2	6	14	14
Pool Spacing (ft)	26			48		30			59		25	70	5	36	68	13
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 52% / 45% / 1% / 1% / 1%					0% / 15% / 78% / 7% / 0% / 0%							1% / 14% / 81% / 3% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	0.5 / 0.9 / 1.7 / 11 / 20					2.0 / 4.2 / 6.9 / 30 / 70							5.6 / 34 / 40 / 56 / 63			
Additional Reach Parameters																
Channel length (ft)	1,275					297					1,230		1,230			
Drainage Area (SM)	0.07					0.38					0.07		0.07			
Rosgen Classification	G					B4c					B4		B4			
Sinuosity	1.20					1.20					1.20		1.20			
Water Surface Slope (ft/ft)	0.0245					0.0130					0.0240		0.0301			

Table 6g. T7-3 Baseline Stream Summary
Cane Creek Stream Restoration Site

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	5.0	6.1	6.5	6.9	3	9.0	9.5		10.0	2	8.2		9.0	9.1	9.1	2
Floodprone Width (ft)	8	9	9	9	3	13	17		20	2	16		15.4	16.9	18.4	2
Bankfull Mean Depth (ft)	0.9	0.9	0.9	1.0	3	1.1	1.2		1.2	2	0.7		0.7	0.8	0.8	2
Bankfull Max Depth (ft)	1.1	1.2	1.3	1.3	3	1.3	1.4		1.5	2	1.1		0.9	1.1	1.3	2
Bankfull Cross-Sectional Area (ft^2)	5.0	5.6	5.9	6.0	3	10.4	10.6		10.7	2	6.0		6.4	7.7	9.0	2
Width/Depth Ratio	6.0	7.0	7.2	7.9	3	8.0	9.0		10.0	2	11.2		11.6	12.3	12.9	2
Entrenchment Ratio	1.2	1.3	1.3	1.4	3	1.3	1.8		2.3	2	2.0		1.7	1.9	2.0	2
Bank Height Ratio	2.8	3.3	3.2	3.8	3			1.0		2	1.0		1.0	1.0	1.0	2
Pattern																
Channel Beltwidth (ft)	24			42				45			29	47	30		60	
Radius of Curvature (ft)	22			58		13			42		15	35	15		35	
Rc:Bankfull width (ft/ft)	3.2			9.7		1.3			4.4		1.8	4.3	1.6		3.8	
Meander Wavelength (ft)	52			115		93			136		55	106	50		110	
Meander Width Ratio	3.5			7		4.5			5.0		3.5	5.7	3.3		6.6	
Profile																
Riffle Length (ft)													15	26	40	15
Riffle Slope (ft/ft)	0.007			0.012		0.013			0.028		0.020	0.030	0.002	0.018	0.035	15
Pool Length (ft)	6			12		3			25		7	30	6	16	54	15
Pool Spacing (ft)	17			42		30			59		32	86	38	55	101	14
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 37% / 62% / 1% / 0% / 0%					0% / 15% / 78% / 7% / 0% / 0%							6% / 33% / 54% / 6% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	0.3 / 1.4 / 5.4 / 15 / 25					2.0 / 4.2 / 6.9 / 30 / 70							0.3 / 1.4 / 6.6 / 45 / 95			
Additional Reach Parameters																
Channel length (ft)	2,023					297					2,088		2,109			
Drainage Area (SM)	0.18					0.38					0.18		0.18			
Rosgen Classification	G4c					B4c					B4c		B4c			
Sinuosity	1.10					1.20					1.10		1.15			
Water Surface Slope (ft/ft)	0.0132					0.0130					0.0128		0.0211			

Table 6h. T7-5 Baseline Stream Summary

Cane Creek Stream Restoration Site

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built*			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)						9.0	9.5		10.0	2	10.4			11.5		1
Floodprone Width (ft)						13	17		20	2	21			21		1
Bankfull Mean Depth (ft)						1.1	1.2		1.2	2	0.9			0.9		1
Bankfull Max Depth (ft)						1.3	1.4		1.5	2	1.2			1.3		1
Bankfull Cross-Sectional Area (ft^2)						10.4	10.6		10.7	2	9.0			10.7		1
Width/Depth Ratio						8.0	9.0		10.0	2	12.0			12.4		1
Entrenchment Ratio						1.3	1.8		2.3	2	2.0			1.9		1
Bank Height Ratio								1.0		2	1.0			1.0		1
Pattern																
Channel Beltwidth (ft)	28							45			20	25	20		25	
Radius of Curvature (ft)	12					13			42		20	25	20		25	
Rc:Bankfull width (ft/ft)						1.3			4.4		1.9	2.4	1.7		2.2	
Meander Wavelength (ft)	62					93			136		64	68	60		70	
Meander Width Ratio						4.5			5.0		2.0	2.5	1.7		2.2	
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%						0% / 15% / 78% / 7% / 0% / 0%							0% / 23% / 63% / 2% / 0% / 12%			
d16 / d35 / d50 / d84 / d95 (mm)						2.0 / 4.2 / 6.9 / 30 / 70							0.9 / 4.4 / 11 / 34 / 55			
Additional Reach Parameters																
Channel length (ft)	185					297					154		147			
Drainage Area (SM)	0.24					0.38					0.24		0.24			
Rosgen Classification	E4					B4c					B4c/C4		B4c/C4			
Sinuosity	1.20					1.20					1.08		1.05			
Water Surface Slope (ft/ft)	0.0145					0.0130					0.0193					

* This is a short reach and does not have a monitored longitudinal profile.

Table 7a. Morphology and Hydraulic Monitoring Summary
Cane Creek Stream Restoration Site

Parameter	Cross-Section 1						Cross-Section 2						Cross-Section 3					
	Pool						Riffle						Pool					
Reach	T1-3						T1-4						T1-4					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	12.6	12.2	13.4	14.9	14.0		17.4	17.8	18.8	18.0	18.2		14.2	14.3	14.4	13.2	14.0	
Floodprone Width (ft)	-	-	-	-	-		39	42	42	41	40		-	-	-	-	-	
Bankfull Mean Depth (ft)	1.6	1.7	2.4	2.4	2.5		1.1	1.1	1.2	1.0	0.9		1.5	1.6	1.4	1.6	1.4	
Bankfull Max Depth (ft)	2.8	2.9	3.5	3.6	3.7		1.9	2.3	2.9	2.2	2.0		2.5	2.9	3.0	3.4	3.2	
Bankfull Cross-Sectional Area (ft2)	20.2	20.9	32.2	35.5	35.2		18.9	19.9	23.3	18.7	17.0		21.9	23.5	19.7	20.5	19.6	
Width/Depth Ratio	-	-	-	-	-		16.0	15.9	15.2	17.3	19.5		-	-	-	-	-	
Entrenchment Ratio	-	-	-	-	-		2.2	2.4	2.2	2.3	2.6		-	-	-	-	-	
Bank Height Ratio	-	-	-	-	-		1.0	1.0	1.0	1.0	1.0		-	-	-	-	-	
Substrate																		
d50 (mm)	5		2	2	12		15	8	8	23	10		2	9	9	3	22	
d84 (mm)	15		15	34	54		40	43	43	38	21		12	30	30	35	64	

Table 7b. Morphology and Hydraulic Monitoring Summary
Cane Creek Stream Restoration Site

Parameter	Cross-Section 4						Cross-Section 5						Cross-Section 6					
	Riffle						Riffle						Pool					
Reach	T1-5						T2-2						T3-2					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	15.3	15.0	17.5	15.6	17.1		7.7	7.5	6.7	6.5	7.8		12.3	12.6	13.5	12.3	14.4	
Floodprone Width (ft)	42	37	37	45	42		21	21	21	21	23		-	-	-	-	-	
Bankfull Mean Depth (ft)	1.5	1.5	1.2	1.2	1.1		0.7	0.6	0.6	0.6	0.7		1.1	0.9	1.1	1.1	1.0	
Bankfull Max Depth (ft)	2.1	2.4	2.3	2.3	2.2		1.2	1.2	1.1	1.0	1.3		2.2	2.1	2.3	2.3	2.3	
Bankfull Cross-Sectional Area (ft^2)	22.2	22.1	21.2	18.8	19.3		5.4	4.7	4.2	4.2	5.1		13.3	11.0	13.3	12.9	15.0	
Width/Depth Ratio	10.5	10.2	14.4	12.9	15.2		11.0	12.0	10.7	10.1	11.9		-	-	-	-	-	
Entrenchment Ratio	2.7	2.5	2.1	2.9	2.5		2.7	2.8	3.1	3.2	2.9		-	-	-	-	-	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0		-	-	-	-	-	
Substrate																		
d50 (mm)	24	27	17	27	26		10	14	14	1	11		1.10		0.62	0.06	0.08	
d84 (mm)	44	Bdrk	Bdrk	59	76		30	31	41	12	32		10.00		0.62	1.20	0.76	

Table 7c. Morphology and Hydraulic Monitoring Summary Cane Creek Stream Restoration Site																		
Parameter	Cross-Section 7						Cross-Section 8						Cross-Section 9					
	Riffle						Riffle						Riffle					
Reach	T3-2						T3-2						T4-1					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	7.8	8.8	9.4	7.9	8.9		8.3	10.3	9.3	8.2	7.8		8.5	8.3	10.4	10.1	9.7	
Floodprone Width (ft)	21	22	22	22	24		24	26	26	23	24		24	25	25	26	29	
Bankfull Mean Depth (ft)	0.5	0.5	0.5	0.6	0.5		0.5	0.6	0.5	0.4	0.4		0.5	0.6	0.5	0.5	0.5	
Bankfull Max Depth (ft)	0.9	0.9	0.9	0.9	0.9		0.9	1.0	1.0	0.9	0.8		1.0	1.1	1.3	1.2	1.2	
Bankfull Cross-Sectional Area (ft^2)	3.9	4.4	4.7	4.5	4.5		4.2	5.8	4.7	3.6	3.5		4.1	4.6	5.3	4.9	4.9	
Width/Depth Ratio	15.6	17.6	18.8	13.9	17.7		16.4	18.3	18.4	18.7	17.4		17.6	15.0	20.4	20.8	19.2	
Entrenchment Ratio	2.7	2.5	2.3	2.7	2.7		2.9	2.5	2.8	2.8	3.0		2.8	3.0	2.4	2.6	3.0	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Substrate																		
d50 (mm)	0.30	1.30	1.30	0.33	0.41		26	18	18	16	6		0	2	7	19	7	
d84 (mm)	6.90	41.00	41.00	33.00	18.00		42	50	50	58	41		13	35	17	45	22	

Table 7d. Morphology and Hydraulic Monitoring Summary Cane Creek Stream Restoration Site																		
Parameter	Cross-Section 10						Cross-Section 11						Cross-Section 12					
	Riffle						Riffle						Pool					
Reach	T4-2						T4-2						T5-2					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	9.1	9.5	8.3	9.3	8.0		8.6	6.7	6.8	6.1	6.6		10.7	10.3	10.5	9.9	10.1	
Floodprone Width (ft)	24	21	21	22	22		26	22	22	21	21		-	-	-	-	-	
Bankfull Mean Depth (ft)	0.6	0.5	0.5	0.4	0.5		0.9	1.0	0.9	0.9	1.0		1.1	1.1	1.3	1.4	1.3	
Bankfull Max Depth (ft)	1.2	0.8	0.8	0.8	0.9		1.7	1.4	1.6	1.2	1.4		2.5	2.5	2.8	2.8	2.8	
Bankfull Cross-Sectional Area (ft^2)	5.9	4.3	4.1	3.9	4.2		7.9	6.4	6.4	5.7	6.3		12.3	11.2	13.6	13.4	12.9	
Width/Depth Ratio	14.0	21.0	16.8	22.2	15.2		9.4	7.0	7.2	6.5	6.9		-	-	-	-	-	
Entrenchment Ratio	2.6	2.2	2.6	2.3	2.8		3.0	3.3	3.2	3.5	3.2		-	-	-	-	-	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0		-	-	-	-	-	
d50 (mm)	8	20	35	17	12		1	35	10	1	3		0	5	25	10	29	
d84 (mm)	39	43	59	39	26		16	Bdrk	25	19	10		1	22	43	41	84	

Table 7e. Morphology and Hydraulic Monitoring Summary
Cane Creek Stream Restoration Site

Parameter	Cross-Section 13						Cross-Section 14						Cross-Section 15					
	Riffle						Riffle						Pool					
Reach	T5-2						T6						T6					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	5.9	6.0	6.9	5.9	5.6		7.1	7.4	7.7	6.9	7.0		4.1	6.0	5.0	5.1	5.2	
Floodprone Width (ft)	21	23	23	27	24		19	26	26	38	35		-	-	-	-	-	
Bankfull Mean Depth (ft)	0.4	0.4	0.4	0.3	0.3		0.5	0.6	0.8	0.8	0.9		0.8	0.7	0.7	0.7	0.7	
Bankfull Max Depth (ft)	0.8	0.7	0.9	0.9	0.8		0.8	1.4	1.8	1.8	1.7		1.2	1.4	1.4	1.4	1.3	
Bankfull Cross-Sectional Area (ft^2)	2.4	2.4	2.6	1.8	1.4		3.4	4.7	5.9	5.8	6.6		3.1	3.9	3.6	3.7	3.6	
Width/Depth Ratio	14.5	15.0	18.3	19.3	22.4		14.8	11.7	10.0	8.2	7.4		-	-	-	-	-	
Entrenchment Ratio	3.6	3.8	3.3	4.6	4.3		2.6	3.5	3.4	5.5	5.0		-	-	-	-	-	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0		-	-	-	-	-	
Substrate																		
d50 (mm)	0.20	0.68	2.80	1.30	0.62		44	7	10	2	4		4	10	23	25	30	
d84 (mm)	4.20	2.00	28.00	42.00	0.62		57	30	26	17	13		20	35	44	54	59	

Table 7f. Morphology and Hydraulic Monitoring Summary
Cane Creek Stream Restoration Site

Parameter	Cross-Section 16						Cross-Section 17						Cross-Section 18					
	Riffle						Pool						Riffle					
Reach	T6						T7-3						T7-3					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	6.3	6.0	7.4	6.9	7.5		7.3	8.8	9.8	10.1	9.4		9.0	9.2	8.2	8.1	8.4	
Floodprone Width (ft)	17	18	18	19	19		-	-	-	-	-		18	19	19	19	21	
Bankfull Mean Depth (ft)	0.6	0.7	0.7	0.6	0.6		1.1	1.2	1.4	1.7	1.8		0.8	0.8	0.9	0.9	0.8	
Bankfull Max Depth (ft)	0.9	1.2	1.2	1.2	1.2		2.0	2.0	2.3	2.6	2.4		1.3	1.4	1.5	1.7	1.5	
Bankfull Cross-Sectional Area (ft2)	3.6	4.1	5.2	4.4	4.6		7.7	10.8	13.3	17.3	17.3		7.2	7.3	7.2	7.4	6.8	
Width/Depth Ratio	11.0	8.8	10.5	10.8	12.2		-	-	-	-	-		11.6	11.6	9.3	8.9	10.4	
Entrenchment Ratio	2.7	3.0	2.4	2.7	2.5		-	-	-	-	-		2.0	2.0	2.3	2.3	2.5	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		-	-	-	-	-		1.0	1.0	1.0	1.0	1.0	
d50 (mm)	35	45	22	19	10		0.30	0.39	0.57	0.12	0.46		21.00	32.00	7.30	0.56	0.82	
d84 (mm)	56	Bdrk	45	52	34		0.50	7.00	3.50	13.00	23.00		58.00	100.00	63.00	20.00	20.00	

Table 7g. Morphology and Hydraulic Monitoring Summary Cane Creek Stream Restoration Site												
Parameter	Cross-Section 19						Cross-Section 20					
	Riffle						Riffle					
Reach	T7-3						T7-5					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	9.1	8.7	8.7	9.9	9.6		11.5	11.9	11.8	12.0	13.1	
Floodprone Width (ft)	15	15	15	18	18		21	21	21	21	23	
Bankfull Mean Depth (ft)	0.7	0.6	0.6	0.6	0.6		0.9	0.8	0.8	0.7	0.7	
Bankfull Max Depth (ft)	0.9	0.8	0.9	1.4	1.3		1.3	1.3	1.5	1.5	1.5	
Bankfull Cross-Sectional Area (ft^2)	6.4	4.8	5.2	6.4	6.1		10.7	9.6	8.9	8.3	8.9	
Width/Depth Ratio	12.9	15.8	14.6	15.3	15.1		12.4	14.8	15.6	17.3	19.3	
Entrenchment Ratio	1.7	1.7	1.7	1.8	1.9		1.9	1.7	1.7	1.7	1.8	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Substrate												
d50 (mm)	2	25	33	2	9		11	41	33	38	34	
d84 (mm)	19	42	74	51	59		34	Bdrk	75	160	150	

Table 7h. Morphology and Hydraulic Monitoring Summary continued Cane Creek Stream Restoration Site															
Reach T1-1															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	16	30	55	10	30	76	6	24	58	7	35	81			
Riffle Slope (ft/ft)	0.0076	0.0160	0.0229	0.0017	0.0131	0.0395	0.0050	0.0113	0.0569	0.0058	0.0099	0.0760			
Pool Length (ft)	5	10	18	4	12	19	5	18	44	11	19	36			
Pool Spacing (ft)	15	66	134	27	82	222	10	64	149	28	72	192			
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0114			0.0111			0.0109			0.0094					
Rosgen Classification	C4/1			C4/1			C4/1			C4/1					

* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

Table 7i. Morphology and Hydraulic Monitoring Summary continued
Cane Creek Stream Restoration Site

Reach T1-2, 3															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	7	14	36	7	30	49	17	19	22	22	26	31			
Riffle Slope (ft/ft)	0.0082	0.0244	0.0421	0.0016	0.0113	0.0223	0.0089	0.0185	0.0301	0.0233	0.0332	0.0490			
Pool Length (ft)	16	23	27	9	18	25	16	28	63	5	20	33			
Pool Spacing (ft)	57	117	169	22	60	107	37	77	104	53	77	100			
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0068			0.0063			0.0068			0.0079					
Rosgen Classification	C4			C4			C4			C4					

* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

Table 7j. Morphology and Hydraulic Monitoring Summary continued
Cane Creek Stream Restoration Site

Reach T3-2															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	2	12	43	1	13	30	5	16	27	9	16	27			
Riffle Slope (ft/ft)	0.0128	0.0342	0.0614	0.0148	0.0652	0.1841	0.0043	0.0275	0.0524	0.0044	0.0177	0.0353			
Pool Length (ft)	2	12	23	3	9	28	2	9	16	3	10	21			
Pool Spacing (ft)	14	46	72	15	57	115	14	57	117	15	63	117			
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0180			0.0175			0.0176			0.0180					
Rosgen Classification	B4			B4			B4			B4					

* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

Table 7k. Morphology and Hydraulic Monitoring Summary continued
Cane Creek Stream Restoration Site

Reach T4-2															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	4	19	36	7	20	52	21	26	32	17	17	17			
Riffle Slope (ft/ft)	0.0006	0.0221	0.0519	0.0004	0.0185	0.0496	0.0102	0.0153	0.0224	**	**	**			
Pool Length (ft)	2	10	30	4	14	35	4	12	32	4	14	26			
Pool Spacing (ft)	7	55	99	9	55	110	14	55	88	26	117	281			
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0151			0.0140			0.0152			**					
Rosgen Classification	B4			B4			B4			B4					

* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

** Water not present in channel at time of survey

Table 7l. Morphology and Hydraulic Monitoring Summary continued
Cane Creek Stream Restoration Site

Reach T6															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	6	13	26	2	12	19	8	8	8	19	25	32			
Riffle Slope (ft/ft)	0.0051	0.0229	0.0472	0.0096	0.0261	0.0334	0.0609	0.0556	0.0784	0.0125	0.0250	0.0378			
Pool Length (ft)	3	7	12	2	8	16	6	9	15	5	8	12			
Pool Spacing (ft)	5	38	106	7	48	115	22	60	129	22	61	140			
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0254			0.0273			0.0272			0.0259					
Rosgen Classification	B4			B4			B4			B4					

Table 7m. Morphology and Hydraulic Monitoring Summary continued
Cane Creek Stream Restoration Site

Reach T7-3															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	4	15	37	5	20	39	7	17	33	10	23	39			
Riffle Slope (ft/ft)	0.0045	0.0266	0.0446	0.0025	0.0181	0.0422	0.0005	0.0227	0.0569	0.0053	0.0274	0.0760			
Pool Length (ft)	5	17	41	6	16	44	6	14	47	7	16	38			
Pool Spacing (ft)	27	55	101	27	58	100	10	59	146	19	54	95			
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0103			0.0105			0.0105			0.0109					
Rosgen Classification	B4c			B4c			B4c			B4c					

* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

Table 7n. Morphology and Hydraulic Monitoring Summary continued
Cane Creek Stream Restoration Site

Reach T7-5															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	7	22	44	9	23	40	10	22	48	5	22	91			
Riffle Slope (ft/ft)	0.0081	0.0349	0.0872	0.0074	0.0293	0.0494	0.0050	0.0289	0.0569	0.0192	0.0409	0.0760			
Pool Length (ft)	2	8	17	4	9	17	2	9	17	3	13	44			
Pool Spacing (ft)	42	74	116	28	54	119	24	49	131	23	47	116			
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0212			0.0204			0.0198			0.0196					
Rosgen Classification	B4c/C4/1			B4c/C4/1			B4c/C4/1			B4c/C4/1					

* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

Appendix A
Vegetation Data and Photos

Table A1. Vegetation History: Stems/Acre Planted and Total with Volunteers
Cane Creek Stream Restoration Site

Plot Number	MY-00	MY-01	MY-02	MY-03		MY-04		MY-05	
	Planted	Planted	Planted	Planted	Total	Planted	Total	Planted	Total
1	1,133	840	526	526	2,630	445	2,064		
2	526	440	364	364	4,452	364	7,001		
3	647	520	526	526	3,440	526	10,927		
4	850	680	607	647	8,013	647	14,973		
5	607	440	243	243	1,295	202	1,295		
6	931	680	486	486	769	324	728		
7	809	720	647	647	3,925	486	4,128		
8	445	320	202	162	526	162	688		
9	809	640	486	486	2,509	445	1,942		
10	567	440	405	364	890	364	1,052		
11	850	720	526	526	1,255	486	1,295		
12	607	560	526	526	3,116	486	2,792		
13	445	240	202	202	1,052	202	931		
14	971	800	688	647	7,891	647	14,326		
15	486	400	364	324	7,365	324	11,695		
16	931	760	769	486	1,659	486	1,295		
17	486	320	243	202	1,052	121	971		
18	567	320	324	283	8,701	243	18,454		
19	647	600	324	364	4,168	324	5,949		
20	486	480	324	283	931	283	1,457		
Site Average	690	546	439	415	3,282	378	5,198		

Table A2. Stem Count Total and Planted by Plot and Species
Cane Creek Stream Restoration Site

			Current Plot Data (MY04 2012)																							
			ECCTS-A-0001			ECCTS-A-0002			ECCTS-A-0003			ECCTS-A-0004			ECCTS-A-0005			ECCTS-A-0006			ECCTS-A-0007			ECCTS-A-0008		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer floridanum	Southern Sugar Maple, Florida M	Tree																								
Acer negundo	boxelder	Tree									1															
Acer rubrum	red maple	Tree																								
Acer saccharum	sugar maple	Tree																								
Ailanthus altissima	tree of heaven	Exotic																								
Alnus serrulata	hazel alder	Shrub												2												
Asimina triloba	pawpaw	Tree							1	1	1															
Baccharis	baccharis	Shrub																								
Baccharis halimifolia	eastern baccharis	Shrub			1			1																		
Betula nigra	river birch	Tree	1	1	1															1			3			
Callicarpa americana	American beautyberry	Shrub																		1						
Carya	hickory	Tree																								
Carya ovata	shagbark hickory	Tree			1							2	2	2	2	2	2									
Celtis laevigata	sugarberry	Tree						1																		
Cercis canadensis	eastern redbud	Tree																								
Cornus amomum	silky dogwood	Shrub		1	2	1	1	1	3	3	3	3	5	5			1	2	4	4	6	6	6			1
Diospyros virginiana	common persimmon	Tree	2	2	2	2	2	3	2	2	2	2	2	2	1	1	3							2	2	3
Fraxinus americana	white ash	Tree																								
Fraxinus pennsylvanica	green ash	Tree				3	3	36	1	1	1			1												
Juglans nigra	black walnut	Tree	2	2	3	1	1	1													4	4	4			
Juniperus virginiana	eastern redcedar	Tree			1						2															5
Ligustrum sinense	Chinese privet	Exotic																								
Liquidambar styraciflua	sweetgum	Tree			25			66			185			200			12						18			3
Liriodendron tulipifera	tuliptree	Tree																1	1	1						
Pinus echinata	shortleaf pine	Tree						1			2			1												
Pinus taeda	loblolly pine	Tree																								
Pinus virginiana	Virginia pine	Tree			1															1			1			
Platanus occidentalis	American sycamore	Tree	1	1	8	1	1	56	3	3	68			143						6	1	1	69			3
Quercus	oak	Tree																								
Quercus alba	white oak	Tree																								
Quercus falcata	southern red oak	Tree	1	1	1							1	1	1	2	2	2				1	1	1			
Quercus lyrata	overcup oak	Tree																								
Quercus michauxii	swamp chestnut oak	Tree																						2	2	2
Quercus pagoda	cherrybark oak	Tree	1	1	1																					
Quercus palustris	pin oak	Tree																								
Quercus phellos	willow oak	Tree				1	1	1	3	3	3															
Rhus	sumac	shrub						3																		
Rhus copallinum	flameleaf sumac	shrub															11									
Robinia	locust																									
Salix	willow	Shrub or Tree																								
Salix nigra	black willow	Tree			1			3			1		1	1						1						
Salix sericea	silky willow	Shrub		2	3								5	5					3	3						
Sambucus canadensis	Common Elderberry	Shrub																								
Ulmus	elm	Tree																								
Ulmus alata	winged elm	Tree									1			7			1									
Ulmus americana	American elm	Tree																								
Ulmus rubra	slippery elm	Tree																								
Unknown		Shrub or Tree																								
		Stem count	8	11	51	9	9	173	13	13	270	8	16	370	5	5	32	3	8	18	12	12	102	4	4	17
		size (ares)	1			1			1			1			1			1			1			1		
		size (ACRES)	0			0			0			0			0			0			0			0		
		Species count	6	8	14	6	6	12	6	6	12	4	6	12	3	3	7	2	3	8	4	4	7	2	2	6
		Stems per ACRE	324	445	2,064	364	364	7,001	526	526	10,927	324	647	14,973	202	202	1,295	121	324	728	486	486	4,128	162	162	688

Table A2. Stem Count Total and Planted by Plot and Species
Cane Creek Stream Restoration Site

			Current Plot Data (MY04 2012)																					
			ECCTS-A-0009			ECCTS-A-0010			ECCTS-A-0011			ECCTS-A-0012			ECCTS-A-0013			ECCTS-A-0014			ECCTS-A-0015			ECCTS-A-0016		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer floridanum	Southern Sugar Maple, Florida M	Tree																					7			
Acer negundo	boxelder	Tree															1									
Acer rubrum	red maple	Tree																								
Acer saccharum	sugar maple	Tree																								
Ailanthus altissima	tree of heaven	Exotic																								
Alnus serrulata	hazel alder	Shrub																								
Asimina triloba	pawpaw	Tree				1	1	1				3	3	3												
Baccharis	baccharis	Shrub																								
Baccharis halimifolia	eastern baccharis	Shrub																								
Betula nigra	river birch	Tree									1												1	5	5	6
Callicarpa americana	American beautyberry	Shrub									1						1									
Carya	hickory	Tree																								
Carya ovata	shagbark hickory	Tree																		23						
Celtis laevigata	sugarberry	Tree																								
Cercis canadensis	eastern redbud	Tree												2			1						1			
Cornus amomum	silky dogwood	Shrub	6	7	8	4	4	4		1	1							8	14	14				2	3	5
Diospyros virginiana	common persimmon	Tree							4	4	5	3	3	3	1	1	1	1	1	22	1	1	2			
Fraxinus americana	white ash	Tree																								
Fraxinus pennsylvanica	green ash	Tree									5															
Juglans nigra	black walnut	Tree	1	1	1	3	3	3									2									
Juniperus virginiana	eastern redcedar	Tree												1												1
Ligustrum sinense	Chinese privet	Exotic																								
Liquidambar styraciflua	sweetgum	Tree			1			4			6			42			3			178			139			13
Liriodendron tulipifera	tuliptree	Tree	2	2	3	1	1	1												2						
Pinus echinata	shortleaf pine	Tree						1						1												
Pinus taeda	loblolly pine	Tree																								
Pinus virginiana	Virginia pine	Tree												7						72						
Platanus occidentalis	American sycamore	Tree			29			10			3			3			7			42			131			3
Quercus	oak	Tree																								
Quercus alba	white oak	Tree																								
Quercus falcata	southern red oak	Tree										6	6	7	4	4	5									
Quercus lyrata	overcup oak	Tree																								
Quercus michauxii	swamp chestnut oak	Tree																			7	7	7	1	1	1
Quercus pagoda	cherrybark oak	Tree																								
Quercus palustris	pin oak	Tree																								
Quercus phellos	willow oak	Tree																								
Rhus	sumac	shrub																								
Rhus copallinum	flameleaf sumac	shrub						1									2									
Robinia	locust																									
Salix	willow	Shrub or Tree																								
Salix nigra	black willow	Tree			5																		1		2	2
Salix sericea	silky willow	Shrub		1	1					7	8								1	1					1	1
Sambucus canadensis	Common Elderberry	Shrub																								
Ulmus	elm	Tree																								
Ulmus alata	winged elm	Tree						1			2															
Ulmus americana	American elm	Tree																								
Ulmus rubra	slippery elm	Tree																								
Unknown		Shrub or Tree																								
	Stem count		9	11	48	9	9	26	4	12	32	12	12	69	5	5	23	9	16	354	8	8	289	8	12	32
	size (ares)		1			1			1			1			1			1			1			1		
	size (ACRES)		0			0			0			0			0			0			0			0		
	Species count		3	4	7	4	4	9	1	3	9	3	3	9	2	2	9	2	3	8	2	2	8	3	5	8
	Stems per ACRE		364	445	1,942	364	364	1,052	162	486	1,295	486	486	2,792	202	202	931	364	647	14,326	324	324	11,695	324	486	1,295

Table A2. Stem Count Total and Planted by Plot and Species
Cane Creek Stream Restoration Site

			Current Plot Data (MY04 2012)											
			ECCTS-A-0017			ECCTS-A-0018			ECCTS-A-0019			ECCTS-A-0020		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer floridanum	Southern Sugar Maple, Florida M	Tree												
Acer negundo	boxelder	Tree			1									
Acer rubrum	red maple	Tree												
Acer saccharum	sugar maple	Tree												
Ailanthus altissima	tree of heaven	Exotic												
Alnus serrulata	hazel alder	Shrub												
Asimina triloba	pawpaw	Tree												
Baccharis	baccharis	Shrub												
Baccharis halimifolia	eastern baccharis	Shrub												
Betula nigra	river birch	Tree			4			1			10			
Callicarpa americana	American beautyberry	Shrub												
Carya	hickory	Tree												
Carya ovata	shagbark hickory	Tree							2	2	3			
Celtis laevigata	sugarberry	Tree						1			1			
Cercis canadensis	eastern redbud	Tree									2			
Cornus amomum	silky dogwood	Shrub	2	2	2					1	1	5	5	5
Diospyros virginiana	common persimmon	Tree												
Fraxinus americana	white ash	Tree												
Fraxinus pennsylvanica	green ash	Tree						154			10			
Juglans nigra	black walnut	Tree			1						3	1	1	1
Juniperus virginiana	eastern redcedar	Tree			4									
Ligustrum sinense	Chinese privet	Exotic												
Liquidambar styraciflua	sweetgum	Tree			6			130			10			13
Liriodendron tulipifera	tuliptree	Tree						2			3			
Pinus echinata	shortleaf pine	Tree												
Pinus taeda	loblolly pine	Tree												
Pinus virginiana	Virginia pine	Tree						1						
Platanus occidentalis	American sycamore	Tree	1	1	2	2	2	163			99			8
Quercus	oak	Tree												
Quercus alba	white oak	Tree			1									
Quercus falcata	southern red oak	Tree							3	3	3	1	1	1
Quercus lyrata	overcup oak	Tree							1	1	1			
Quercus michauxii	swamp chestnut oak	Tree												
Quercus pagoda	cherrybark oak	Tree												
Quercus palustris	pin oak	Tree			3									
Quercus phellos	willow oak	Tree				4	4	4						
Rhus	sumac	shrub												
Rhus copallinum	flameleaf sumac	shrub												4
Robinia	locust													
Salix	willow	Shrub or Tree												
Salix nigra	black willow	Tree												1
Salix sericea	silky willow	Shrub								1	1			
Sambucus canadensis	Common Elderberry	Shrub												
Ulmus	elm	Tree												
Ulmus alata	winged elm	Tree												3
Ulmus americana	American elm	Tree												
Ulmus rubra	slippery elm	Tree												
Unknown		Shrub or Tree												
		Stem count	3	3	24	6	6	456	6	8	147	7	7	36
		size (ares)	1			1			1			1		
		size (ACRES)	0			0			0			0		
		Species count	2	2	9	2	2	8	3	5	13	3	3	8
		Stems per ACRE	121	121	971	243	243	18,454	243	324	5,949	283	283	1,457

Table A2. Stem Count Total and Planted by Plot and Species
Cane Creek Stream Restoration Site

			Annual Means													
			MY4 (2012)			MY3 (2011)			MY2 (2010)			MY1 (2009)			MY0 (2008)		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer floridanum	Southern Sugar Maple, Florida M	Tree			7												
Acer negundo	boxelder	Tree			3												
Acer rubrum	red maple	Tree						3			31			5			
Acer saccharum	sugar maple	Tree						5									
Ailanthus altissima	tree of heaven	Exotic												3			
Alnus serrulata	hazel alder	Shrub			2			3						1			
Asimina triloba	pawpaw	Tree	5	5	5	4	4	4	4	4	4	8	8	8			
Baccharis	baccharis	Shrub						2			1						
Baccharis halimifolia	eastern baccharis	Shrub			2												
Betula nigra	river birch	Tree	6	6	28	6	6	31	8	8	8	10	10	10	10	10	10
Callicarpa americana	American beautyberry	Shrub			3	1	1	1	2	2	2	4	4	4			
Carya	hickory	Tree													2	2	2
Carya ovata	shagbark hickory	Tree	6	6	31	5	5	15	3	3	3	5	5	10			
Celtis laevigata	sugarberry	Tree			3			2				1	1	1			
Cercis canadensis	eastern redbud	Tree			6			6									
Cornus amomum	silky dogwood	Shrub	42	57	63	45	60	62	47	70	70	48	81	81	53	98	98
Diospyros virginiana	common persimmon	Tree	21	21	48	23	23	43	23	23	28	34	34	41	3	3	3
Fraxinus americana	white ash	Tree						1									
Fraxinus pennsylvanica	green ash	Tree	4	4	207	4	4	121	4	4	5	4	4	33	13	13	13
Juglans nigra	black walnut	Tree	12	12	19	18	18	25	14	14	14	17	17	20			
Juniperus virginiana	eastern redcedar	Tree			14			17			4			4			
Ligustrum sinense	Chinese privet	Exotic						3									
Liquidambar styraciflua	sweetgum	Tree			1054			677			171			221			
Liriodendron tulipifera	tuliptree	Tree	4	4	12	6	6	14	5	5	8	15	15	39	5	5	5
Pinus echinata	shortleaf pine	Tree			6												
Pinus taeda	loblolly pine	Tree						5									
Pinus virginiana	Virginia pine	Tree			83			14									
Platanus occidentalis	American sycamore	Tree	9	9	853	8	8	450	8	8	130	10	10	181	12	12	12
Quercus	oak	Tree							4	4	4	5	5	5	46	46	46
Quercus alba	white oak	Tree			1												
Quercus falcata	southern red oak	Tree	19	19	21	22	22	24	22	22	22	25	25	25	3	3	3
Quercus lyrata	overcup oak	Tree	1	1	1												
Quercus michauxii	swamp chestnut oak	Tree	10	10	10	10	10	11	11	11	11	12	12	12	13	13	13
Quercus pagoda	cherrybark oak	Tree	1	1	1	2	2	3	1	1	1	1	1	1			
Quercus palustris	pin oak	Tree			3												
Quercus phellos	willow oak	Tree	8	8	8	9	9	10	6	6	9	6	6	6	3	3	3
Rhus	sumac	shrub			3			3			1			1			
Rhus copallinum	flameleaf sumac	shrub			18			8									
Robinia	locust							2									
Salix	willow	Shrub or Tree					1	1		1	5		1	1		21	21
Salix nigra	black willow	Tree		3	16		2	18		2	2		3	4		2	2
Salix sericea	silky willow	Shrub		21	23		24	31		22	22		23	23		4	4
Sambucus canadensis	Common Elderberry	Shrub								1	1		1	1		3	3
Ulmus	elm	Tree									1						
Ulmus alata	winged elm	Tree			15			5			1			1			
Ulmus americana	American elm	Tree						2						5			
Ulmus rubra	slippery elm	Tree												4			
Unknown		Shrub or Tree							6	6	6	7	7	7	103	103	103
	Stem count		148	187	2,569	163	205	1,622	168	217	565	212	273	758	266	341	341
	size (ares)		20			20			20			20			20		
	size (ACRES)		0			0			0			0			0		
	Species count		14	16	32	14	17	34	16	20	27	17	21	30	12	16	16
	Stems per ACRE		299	378	5,198	330	415	3,282	340	439	1,143	429	552	1,534	538	690	690

Vegetation Plot 1: View looking toward plot center from origin corner. 6/21/12 – MY-04

Vegetation Plot 2: View looking toward plot center from origin corner. 6/21/12 – MY-04

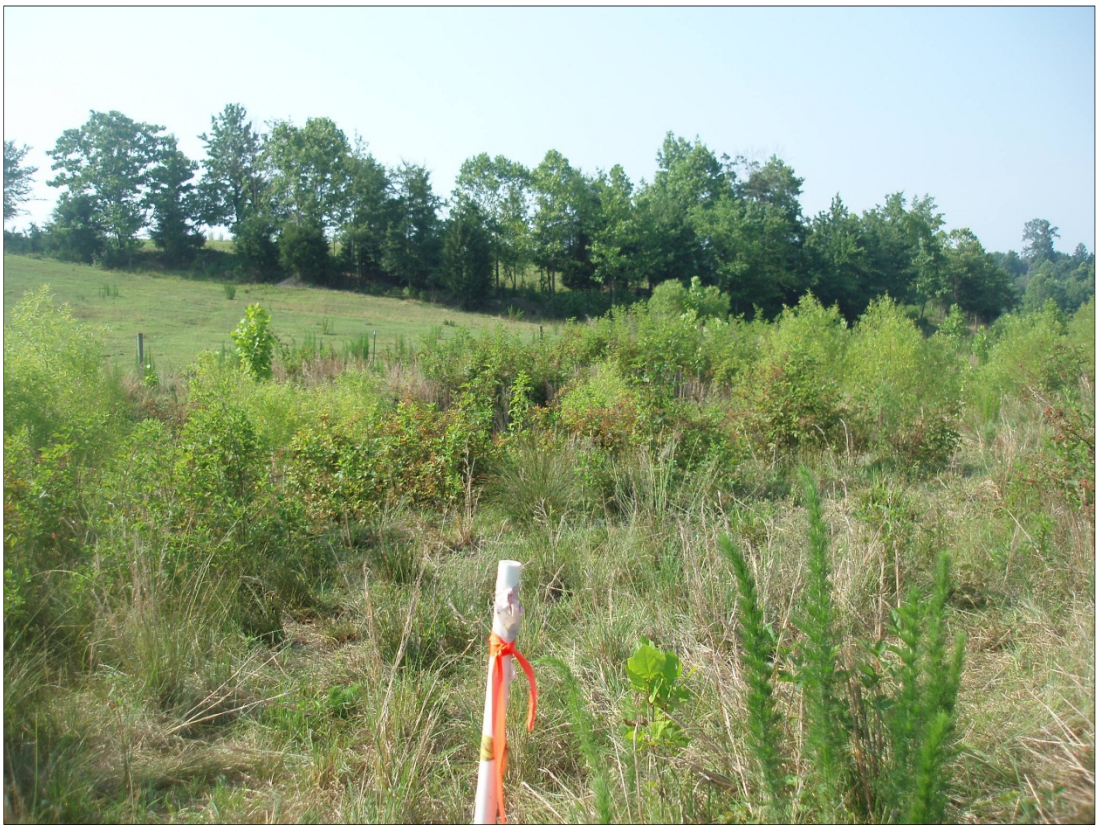
Vegetation Plot 3: View looking toward plot center from origin corner. 6/19/12 – MY-04

Vegetation Plot 4: View looking toward plot center from origin corner. 6/19/12 – MY-04

Vegetation Plot 5: View looking toward plot center from origin corner. 6/21/12 – MY-04

Vegetation Plot 6: View looking toward plot center from origin corner. 6/21/12 – MY-04

Vegetation Plot 7: View looking toward plot center from origin corner. 6/21/12 – MY-04



Vegetation Plot 8: View looking toward plot center from origin corner. 6/21/12 – MY-04

Vegetation Plot 9: View looking toward plot center from origin corner. 6/19/12 – MY-04

Vegetation Plot 10: View looking toward plot center from origin corner. 6/19/12 – MY-04

Vegetation Plot 11: View looking toward plot center from origin corner. 6/19/12 – MY-04

Vegetation Plot 12: View looking toward plot center from origin corner. 6/19/12 – MY-04

Vegetation Plot 13: View looking toward plot center from origin corner. 6/19/12 – MY-04

Vegetation Plot 14: View looking toward plot center from origin corner. 6/15/12 – MY-04

Vegetation Plot 15: View looking toward plot center from origin corner. 6/15/12 – MY-04

Vegetation Plot 16: View looking toward plot center from origin corner. 6/15/12 – MY-04

Vegetation Plot 17: View looking toward plot center from origin corner. 6/15/12 – MY-04

Vegetation Plot 18: View looking toward plot center from origin corner. 6/15/12 – MY-04

Vegetation Plot 19: View looking toward plot center from origin corner. 6/15/12 – MY-04

Vegetation Plot 20: View looking toward plot center from origin corner. 6/19/12 – MY-04

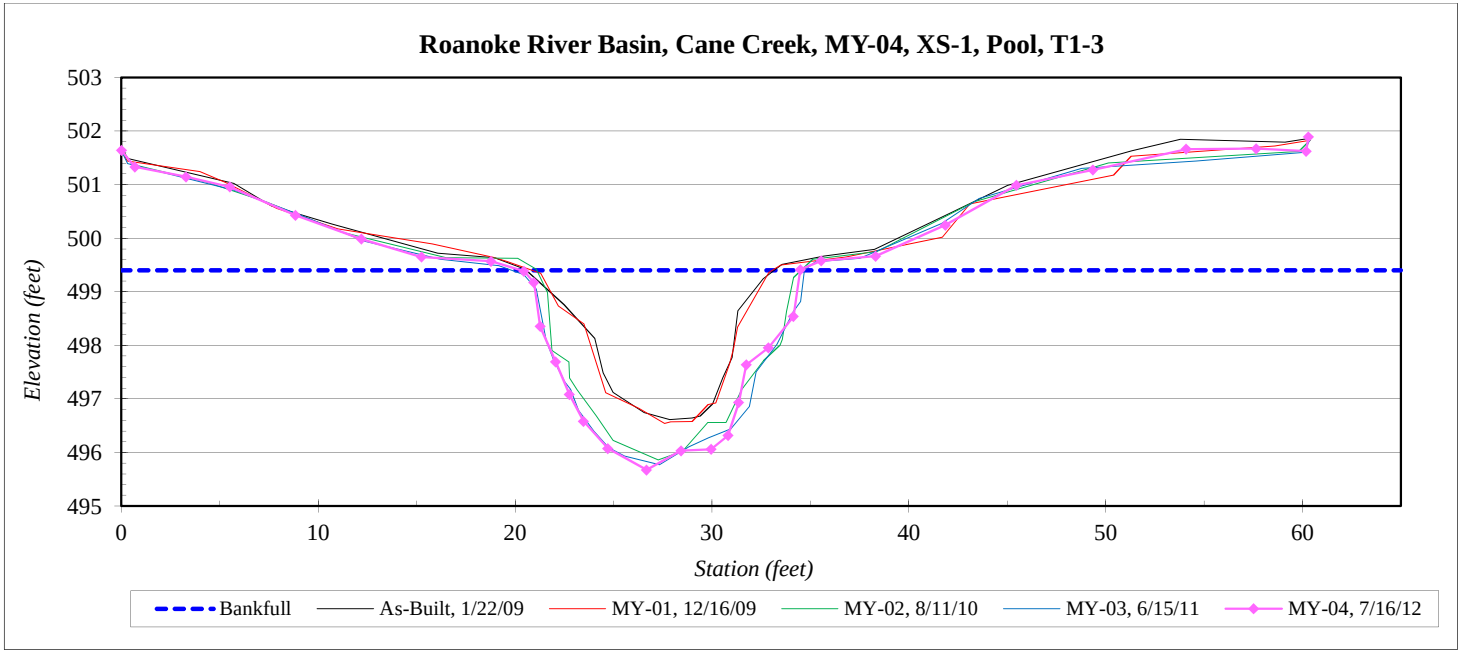
Appendix B
Geomorphologic Data

River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-1, Pool, T1-3
Drainage Area (sq mi):	0.49
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	501.64
0.7	501.33
3.3	501.15
5.5	500.96
8.8	500.43
12.2	499.98
15.2	499.65
18.8	499.57
20.5	499.38
21.0	499.17
21.3	498.35
22.1	497.69
22.8	497.08
23.5	496.58
24.7	496.07
26.7	495.67
28.4	496.03
30.0	496.06
30.8	496.32
31.4	496.93
31.7	497.64
32.9	497.96
34.1	498.54
34.5	499.41
35.5	499.58
38.3	499.67
41.9	500.24
45.5	500.99
49.4	501.28
54.1	501.66
57.7	501.67
60.2	501.62
60.3	501.89

SUMMARY DATA	
Bankfull Elevation:	499.4
Bankfull Cross-Sectional Area:	35.2
Bankfull Width:	14.0
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	3.7
Mean Depth at Bankfull:	2.5
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-

Stream Type	C/B4

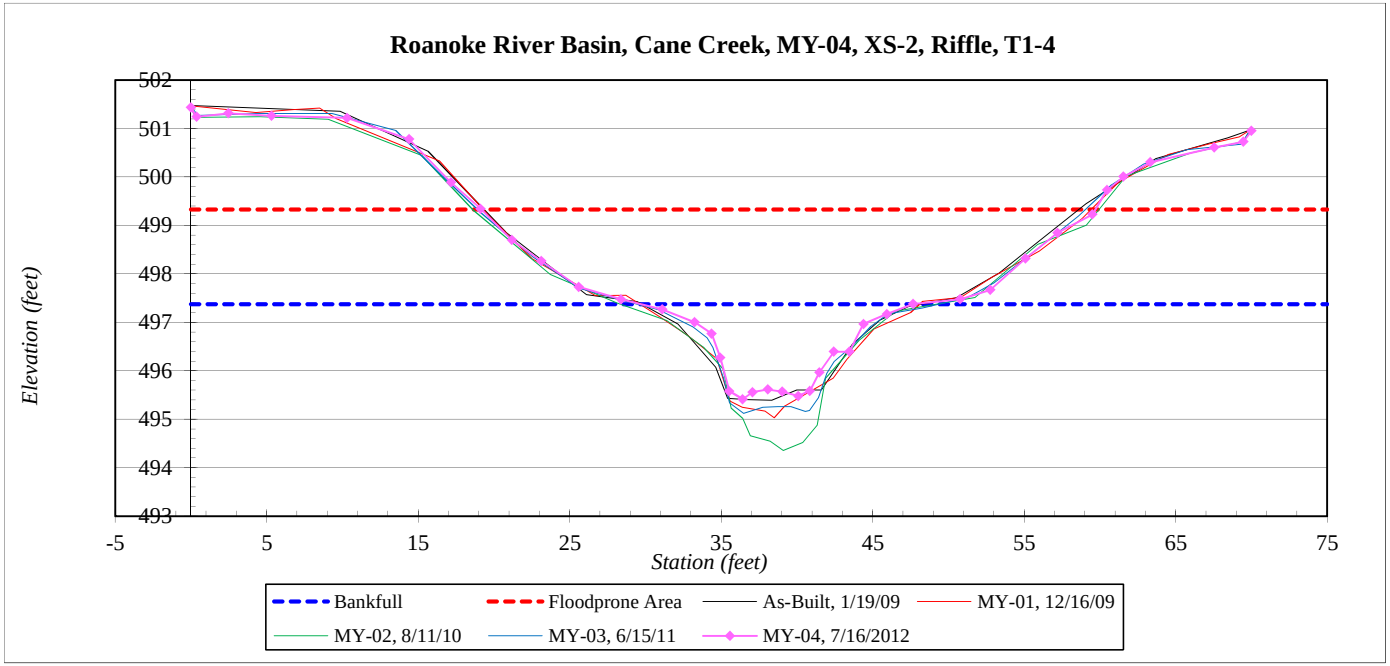


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-2, Riffle, T1-4
Drainage Area (sq mi):	0.62
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	501.44
0.4	501.24
2.5	501.32
5.3	501.26
10.3	501.22
14.4	500.78
17.2	499.89
19.1	499.34
21.2	498.70
23.1	498.27
25.6	497.73
28.4	497.48
31.1	497.26
33.3	497.00
34.4	496.76
34.9	496.27
35.5	495.58
36.4	495.41
37.1	495.56
38.1	495.61
39.0	495.57
40.1	495.48
40.9	495.58
41.5	495.97
42.4	496.40
43.5	496.39
44.4	496.97
45.9	497.17
47.7	497.38
50.8	497.48
52.8	497.67
55.1	498.32
57.2	498.85
59.5	499.23
60.5	499.73
61.6	500.01
63.3	500.31
67.5	500.61
69.5	500.73
70.0	500.95

SUMMARY DATA	
Bankfull Elevation:	497.4
Bankfull Cross-Sectional Area:	17.0
Bankfull Width:	18.2
Flood Prone Area Elevation:	499.3
Flood Prone Width:	40.0
Max Depth at Bankfull:	2.0
Mean Depth at Bankfull:	0.9
W / D Ratio:	19.5
Entrenchment Ratio:	2.2
Bank Height Ratio:	1.0

Stream Type	C/B4

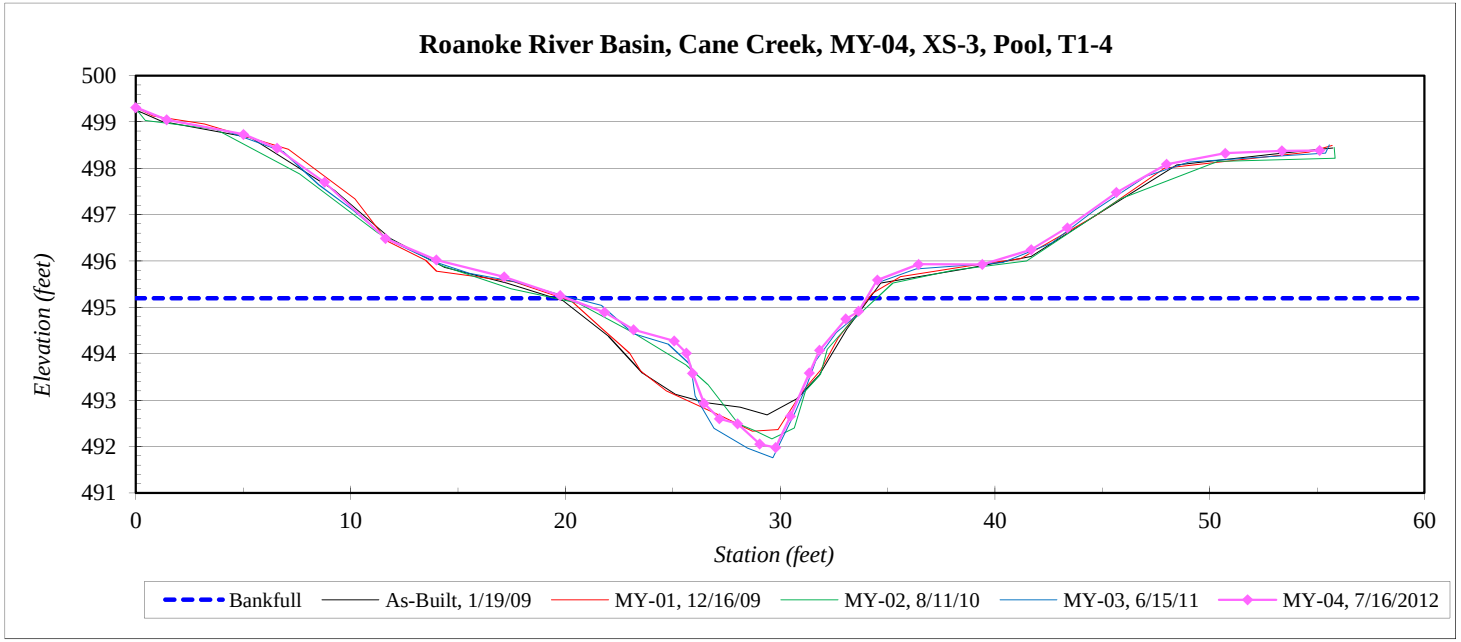


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-3, Pool, T1-4
Drainage Area (sq mi):	0.62
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	499.31
1.4	499.05
5.0	498.73
6.6	498.43
8.8	497.70
11.6	496.49
14.0	496.02
17.2	495.66
19.8	495.25
21.8	494.89
23.2	494.52
25.1	494.27
25.6	494.01
25.9	493.58
26.5	492.93
27.2	492.60
28.0	492.49
29.1	492.05
29.8	491.98
30.5	492.66
31.4	493.58
31.8	494.07
33.1	494.75
33.7	494.91
34.5	495.59
36.5	495.93
39.4	495.93
41.7	496.24
43.4	496.72
45.7	497.48
48.0	498.09
50.7	498.32
53.4	498.38
55.1	498.38
55.6	498.56

SUMMARY DATA	
Bankfull Elevation:	495.2
Bankfull Cross-Sectional Area:	19.6
Bankfull Width:	14.0
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	3.2
Mean Depth at Bankfull:	1.4
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-

Stream Type	C/B4

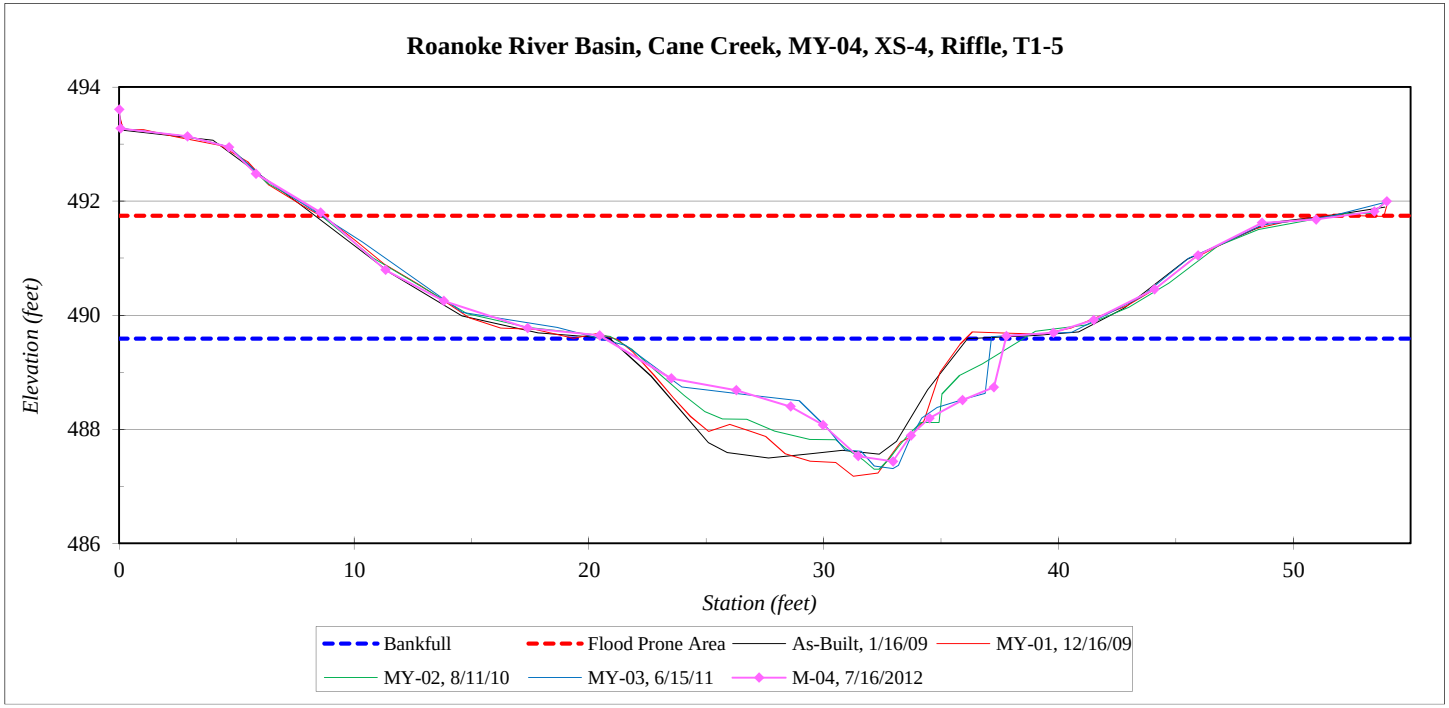


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-4, Riffle, T1-5
Drainage Area (sq mi):	0.70
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	493.61
0.0	493.27
2.9	493.14
4.7	492.95
5.8	492.48
8.6	491.80
11.3	490.79
13.8	490.25
17.4	489.77
20.5	489.65
23.5	488.89
26.3	488.68
28.6	488.40
30.0	488.08
31.5	487.53
33.0	487.44
33.7	487.89
34.5	488.19
35.9	488.51
37.3	488.74
37.8	489.63
39.8	489.69
41.5	489.92
44.1	490.45
45.9	491.05
48.7	491.62
51.0	491.68
53.5	491.82
54.0	491.99

SUMMARY DATA	
Bankfull Elevation:	489.6
Bankfull Cross-Sectional Area:	19.3
Bankfull Width:	17.1
Flood Prone Area Elevation:	491.7
Flood Prone Width:	42.0
Max Depth at Bankfull:	2.2
Mean Depth at Bankfull:	1.1
W / D Ratio:	15.2
Entrenchment Ratio:	2.5
Bank Height Ratio:	1.0

Stream Type	C/B4

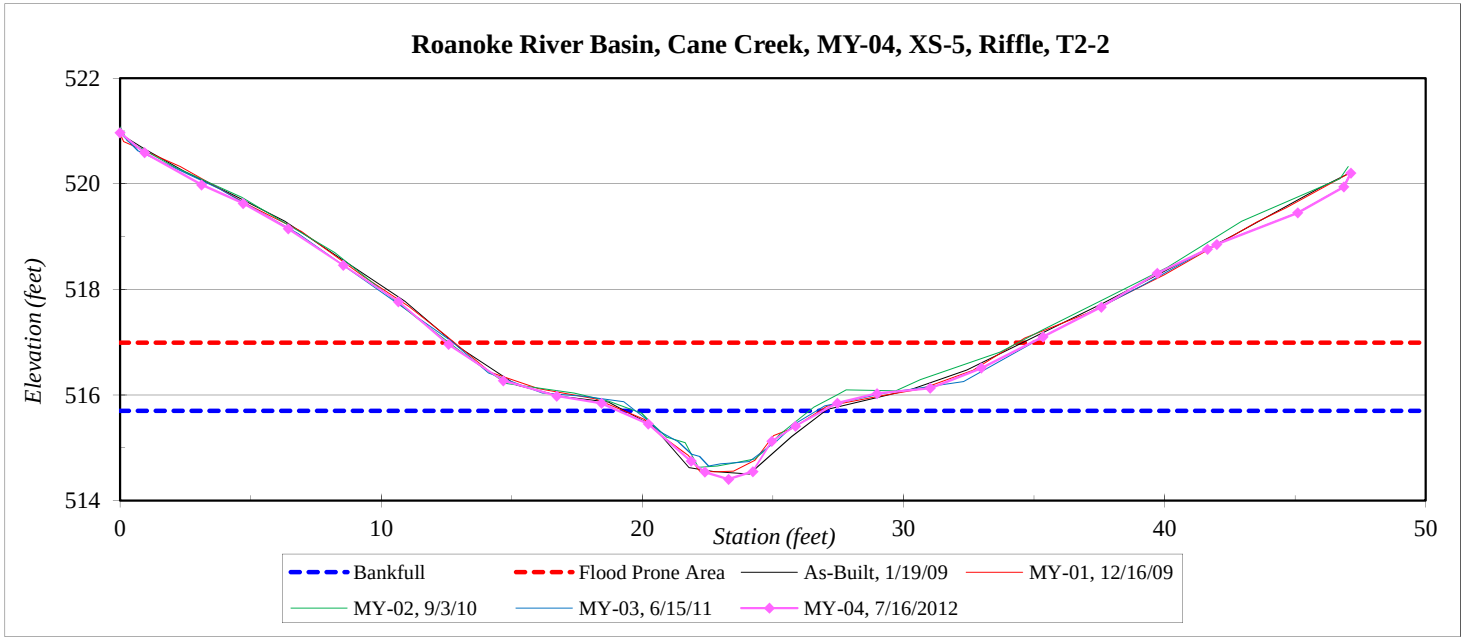


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-5, Riffle, T2-2
Drainage Area (sq mi):	0.11
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	520.97
0.9	520.59
3.1	519.98
4.7	519.63
6.4	519.15
8.6	518.46
10.7	517.77
12.6	516.96
14.7	516.27
16.7	515.98
18.4	515.85
20.2	515.45
21.9	514.75
22.4	514.54
23.3	514.41
24.2	514.55
25.0	515.13
25.9	515.41
27.5	515.85
29.0	516.03
31.0	516.13
33.0	516.51
35.3	517.10
37.6	517.67
39.7	518.31
41.7	518.76
42.0	518.85
45.1	519.45
46.9	519.94
47.1	520.20

SUMMARY DATA	
Bankfull Elevation:	515.7
Bankfull Cross-Sectional Area:	5.1
Bankfull Width:	7.8
Flood Prone Area Elevation:	517.0
Flood Prone Width:	23.0
Max Depth at Bankfull:	1.3
Mean Depth at Bankfull:	0.7
W / D Ratio:	11.9
Entrenchment Ratio:	2.9
Bank Height Ratio:	1.0

Stream Type	C/E4

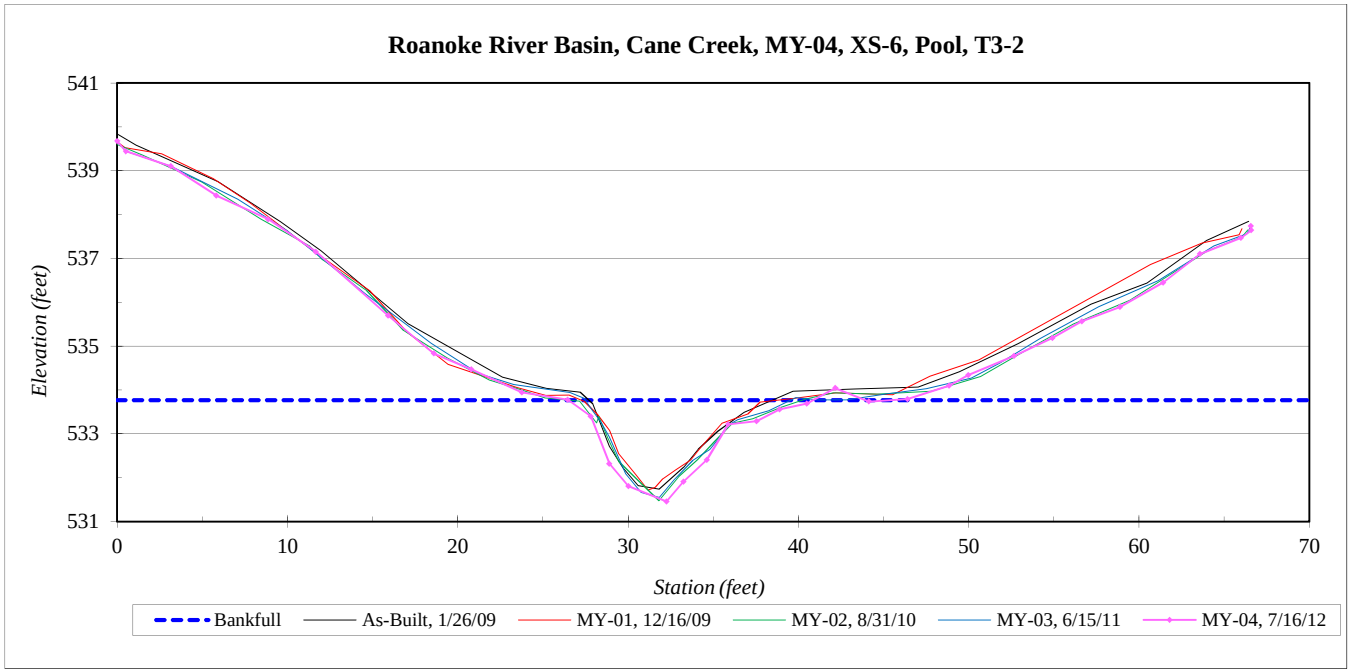


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-6, Pool, T3-2
Drainage Area (sq mi):	0.08
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	539.68
0.5	539.45
3.2	539.10
5.8	538.43
8.9	537.89
11.7	537.15
15.9	535.69
18.6	534.83
20.8	534.47
23.8	533.95
26.5	533.78
27.8	533.40
28.9	532.31
30.0	531.81
32.2	531.46
33.3	531.91
34.6	532.41
35.9	533.21
37.6	533.29
38.9	533.56
40.5	533.69
42.2	534.04
44.1	533.74
46.4	533.79
48.9	534.10
50.0	534.34
52.7	534.78
54.9	535.18
56.6	535.56
58.9	535.89
61.4	536.45
63.6	537.10
66.0	537.47
66.6	537.64
66.6	537.74

SUMMARY DATA	
Bankfull Elevation:	533.8
Bankfull Cross-Sectional Area:	15.0
Bankfull Width:	14.4
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	2.3
Mean Depth at Bankfull:	1.0
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-

Stream Type	B4

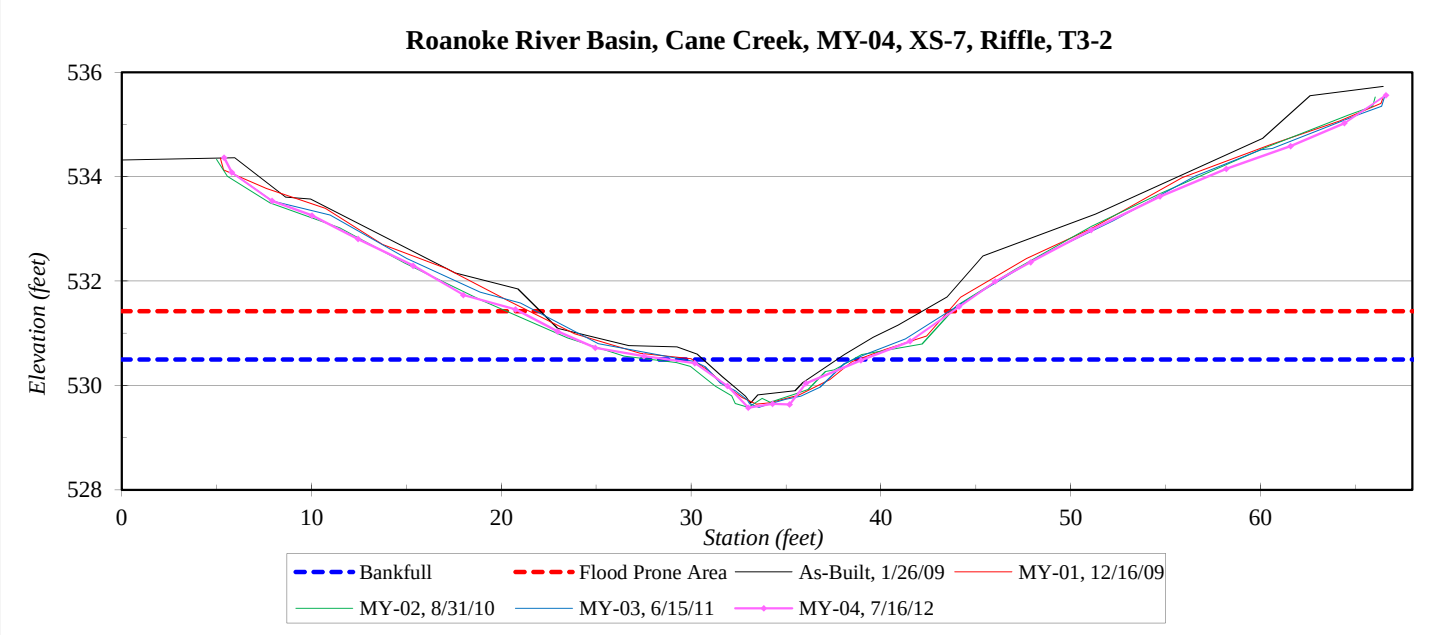


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-7, Riffle, T3-2
Drainage Area (sq mi):	0.08
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	534.36
0.4	534.08
2.5	533.54
4.6	533.26
7.1	532.81
10.0	532.29
12.6	531.73
15.4	531.45
17.6	531.03
19.6	530.72
22.1	530.56
24.8	530.43
26.5	529.99
27.6	529.57
28.9	529.65
29.8	529.63
30.7	530.04
33.6	530.48
36.1	530.85
38.7	531.51
40.6	531.99
42.5	532.36
45.7	532.98
49.3	533.62
52.8	534.15
56.2	534.59
59.0	535.03
61.2	535.56

SUMMARY DATA	
Bankfull Elevation:	530.5
Bankfull Cross-Sectional Area:	4.5
Bankfull Width:	8.9
Flood Prone Area Elevation:	531.4
Flood Prone Width:	24.0
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.5
W / D Ratio:	17.6
Entrenchment Ratio:	2.7
Bank Height Ratio:	1.0

Stream Type	B4

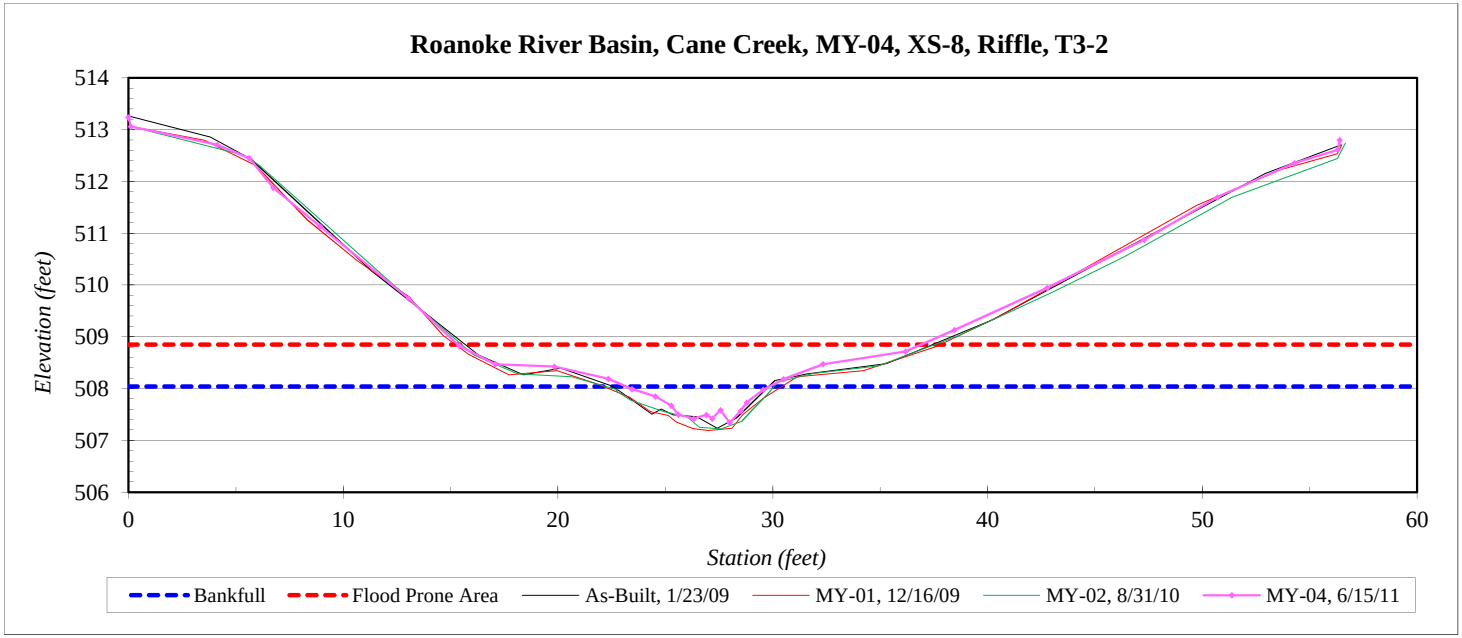


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-8, Riffle, T3-2
Drainage Area (sq mi):	0.08
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	513.24
0.6	512.90
3.6	512.63
6.1	512.11
7.3	511.65
9.7	510.76
12.2	509.92
14.8	508.95
16.7	508.43
19.7	508.27
22.3	508.05
23.5	507.81
24.7	507.66
25.6	507.45
26.2	507.23
26.9	507.28
27.6	507.27
29.3	507.66
30.0	508.02
32.0	508.27
34.5	508.39
38.4	509.02
41.6	509.61
45.3	510.42
49.0	511.20
53.2	512.13
56.0	512.50
56.4	512.71
56.3	512.80

SUMMARY DATA	
Bankfull Elevation:	508.0
Bankfull Cross-Sectional Area:	3.5
Bankfull Width:	7.8
Flood Prone Area Elevation:	508.8
Flood Prone Width:	23.5
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.4
W / D Ratio:	17.4
Entrenchment Ratio:	3.0
Bank Height Ratio:	1.0

Stream Type	B4

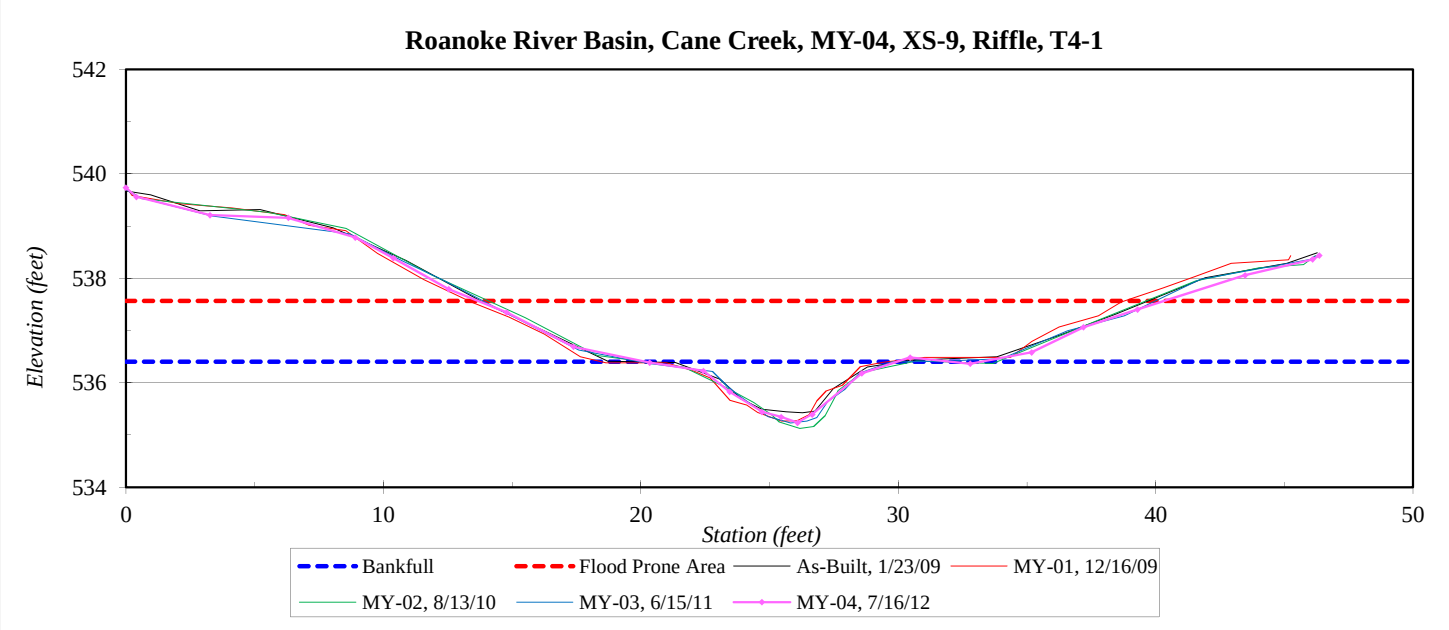


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-9, Riffle, T4-1
Drainage Area (sq mi):	0.10
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	539.73
0.4	539.56
3.3	539.21
6.3	539.16
8.9	538.78
10.4	538.38
12.5	537.79
14.8	537.35
17.4	536.69
20.3	536.39
22.4	536.23
23.5	535.82
24.7	535.44
25.5	535.34
26.1	535.23
26.7	535.39
28.6	536.18
30.5	536.48
32.8	536.36
35.2	536.58
37.2	537.06
39.3	537.40
43.5	538.06
46.1	538.36
46.4	538.44

SUMMARY DATA	
Bankfull Elevation:	536.4
Bankfull Cross-Sectional Area:	4.9
Bankfull Width:	9.7
Flood Prone Area Elevation:	537.6
Flood Prone Width:	29.0
Max Depth at Bankfull:	1.2
Mean Depth at Bankfull:	0.5
W / D Ratio:	19.2
Entrenchment Ratio:	3.0
Bank Height Ratio:	1.0

Stream Type	B4



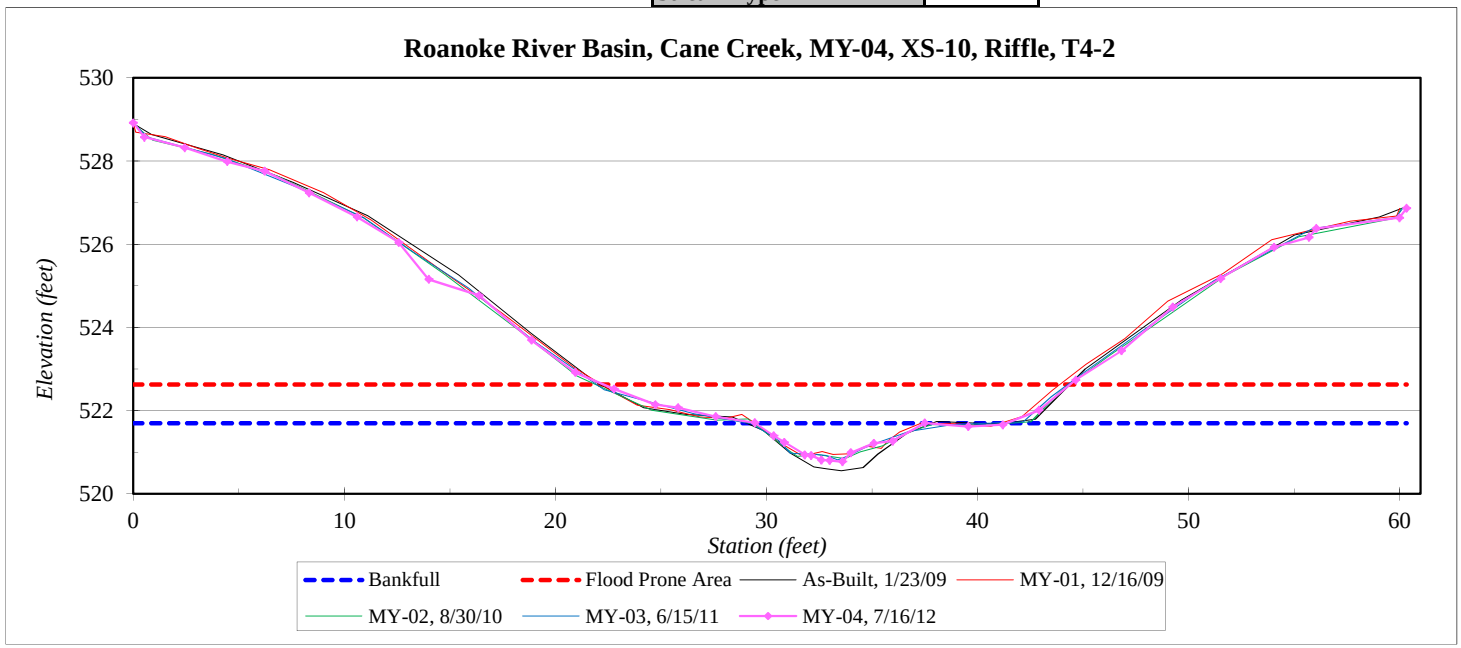
River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-10, Riffle, T4-2
Drainage Area (sq mi):	0.10
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	528.92
0.5	528.58
2.4	528.32
4.4	527.98
6.2	527.76
8.3	527.24
10.6	526.65
12.6	526.04
14.0	525.16
16.4	524.77
18.9	523.69
20.9	522.92
22.8	522.52
24.7	522.15
25.8	522.07
27.6	521.86
29.4	521.71
30.3	521.40
30.8	521.24
31.8	520.94
32.1	520.92
32.6	520.82
33.0	520.81
33.6	520.77
34.0	520.99
35.1	521.21
36.0	521.27
37.5	521.71
39.6	521.62
41.2	521.66
42.9	522.01
44.7	522.74
46.8	523.44
49.2	524.49
51.5	525.18

*Other shots not included due to space

SUMMARY DATA	
Bankfull Elevation:	521.7
Bankfull Cross-Sectional Area:	4.2
Bankfull Width:	8.0
Flood Prone Area Elevation:	522.6
Flood Prone Width:	22.0
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.5
W / D Ratio:	15.2
Entrenchment Ratio:	2.8
Bank Height Ratio:	1.0

Stream Type	B4

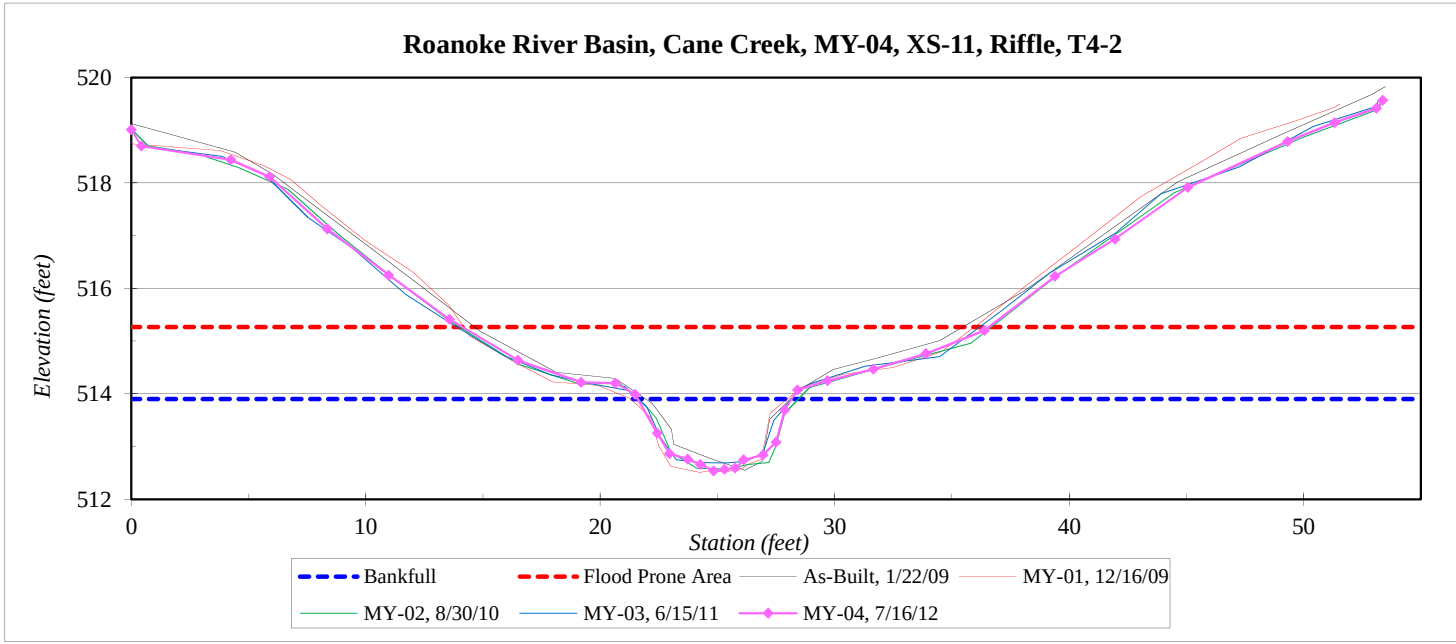


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-11, Riffle, T4-2
Drainage Area (sq mi):	0.10
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	519.01
0.4	518.70
4.2	518.44
5.9	518.12
8.4	517.13
11.0	516.25
13.6	515.41
16.5	514.63
19.2	514.22
20.6	514.20
21.5	513.98
22.4	513.25
23.0	512.86
23.7	512.76
24.3	512.66
24.8	512.54
25.3	512.57
25.8	512.59
26.1	512.75
26.9	512.84
27.5	513.08
27.9	513.69
28.4	514.07
29.7	514.25
31.7	514.47
33.9	514.76
36.4	515.20
39.4	516.23
42.0	516.94
45.1	517.92
49.3	518.79
51.3	519.15
53.1	519.42
53.4	519.57

SUMMARY DATA	
Bankfull Elevation:	513.9
Bankfull Cross-Sectional Area:	6.3
Bankfull Width:	6.6
Flood Prone Area Elevation:	515.3
Flood Prone Width:	21.0
Max Depth at Bankfull:	1.4
Mean Depth at Bankfull:	1.0
W / D Ratio:	6.9
Entrenchment Ratio:	3.2
Bank Height Ratio:	1.0

Stream Type	B4

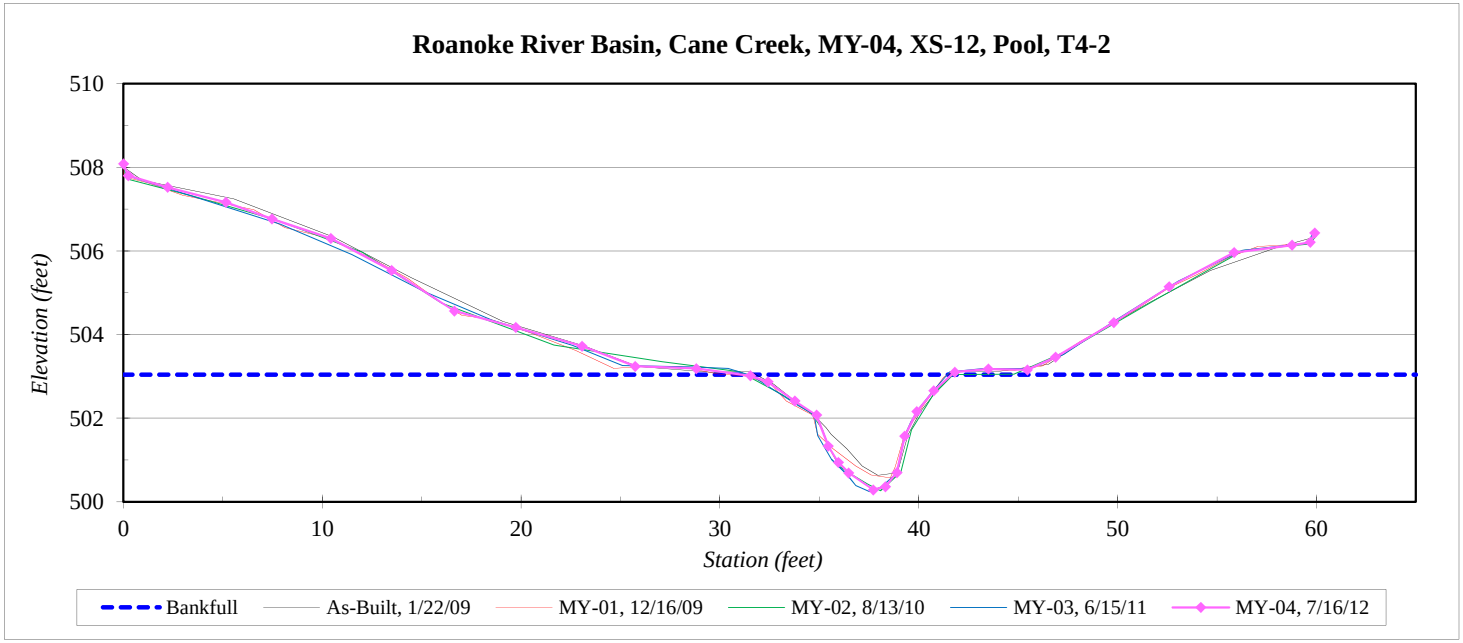


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-12, Pool, T4-2
Drainage Area (sq mi):	0.10
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	508.08
0.2	507.80
2.2	507.52
5.2	507.16
7.5	506.76
10.4	506.30
13.5	505.53
16.6	504.56
19.7	504.17
23.1	503.72
25.7	503.24
28.8	503.19
31.5	503.01
32.4	502.87
33.8	502.41
34.9	502.07
35.4	501.33
35.9	500.95
36.5	500.69
37.7	500.29
38.3	500.36
38.9	500.70
39.3	501.57
39.9	502.16
40.8	502.66
41.8	503.10
43.5	503.17
45.5	503.15
46.9	503.46
49.8	504.29
52.6	505.14
55.9	505.96
58.8	506.13
59.7	506.21
59.9	506.43

SUMMARY DATA	
Bankfull Elevation:	503.0
Bankfull Cross-Sectional Area:	12.9
Bankfull Width:	10.1
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	2.8
Mean Depth at Bankfull:	1.3
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-

Stream Type	B4

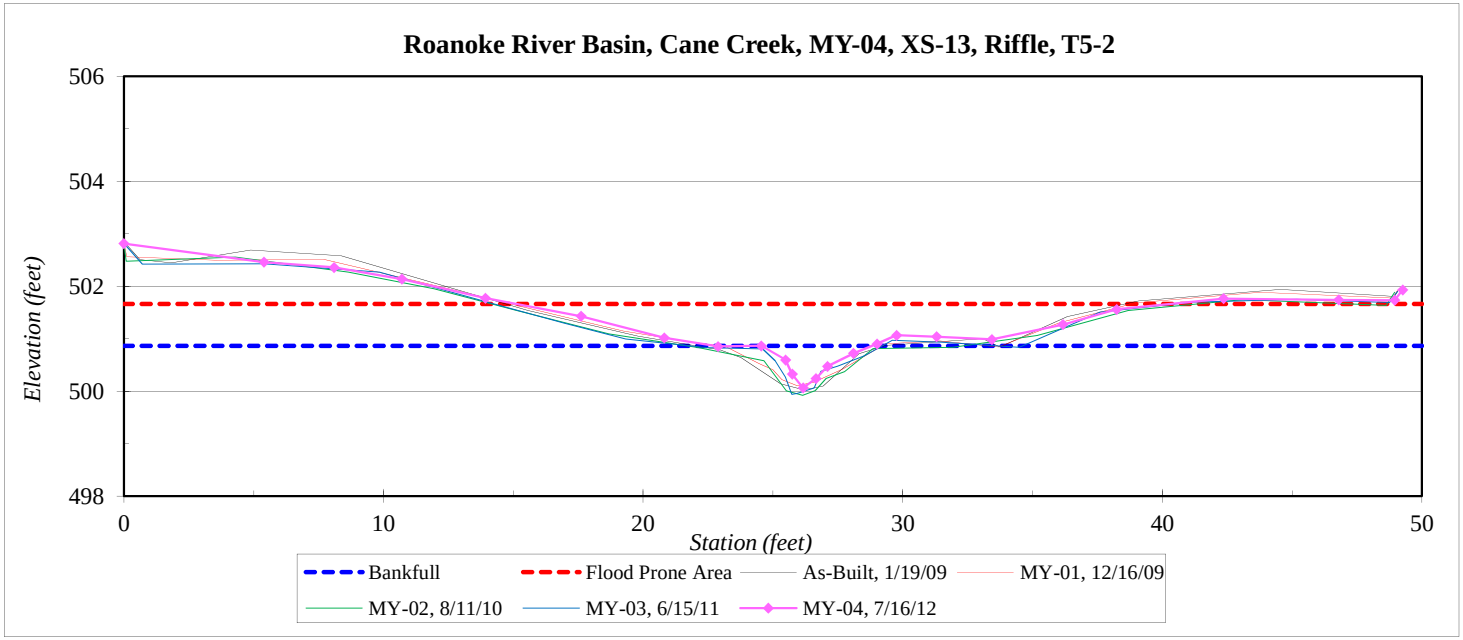


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-13, Riffle, T5-2
Drainage Area (sq mi):	0.02
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	502.81
5.4	502.46
8.1	502.36
10.7	502.13
13.9	501.77
17.6	501.43
20.8	501.02
22.9	500.85
24.5	500.86
25.5	500.59
25.7	500.32
26.2	500.06
26.7	500.24
27.1	500.47
28.1	500.72
29.0	500.90
29.8	501.06
31.3	501.04
33.4	500.98
36.2	501.27
38.2	501.56
42.4	501.76
46.8	501.74
49.0	501.73
49.3	501.93

SUMMARY DATA	
Bankfull Elevation:	500.9
Bankfull Cross-Sectional Area:	1.4
Bankfull Width:	5.6
Flood Prone Area Elevation:	501.7
Flood Prone Width:	24.0
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.3
W / D Ratio:	22.4
Entrenchment Ratio:	4.3
Bank Height Ratio:	1.0

Stream Type	B4

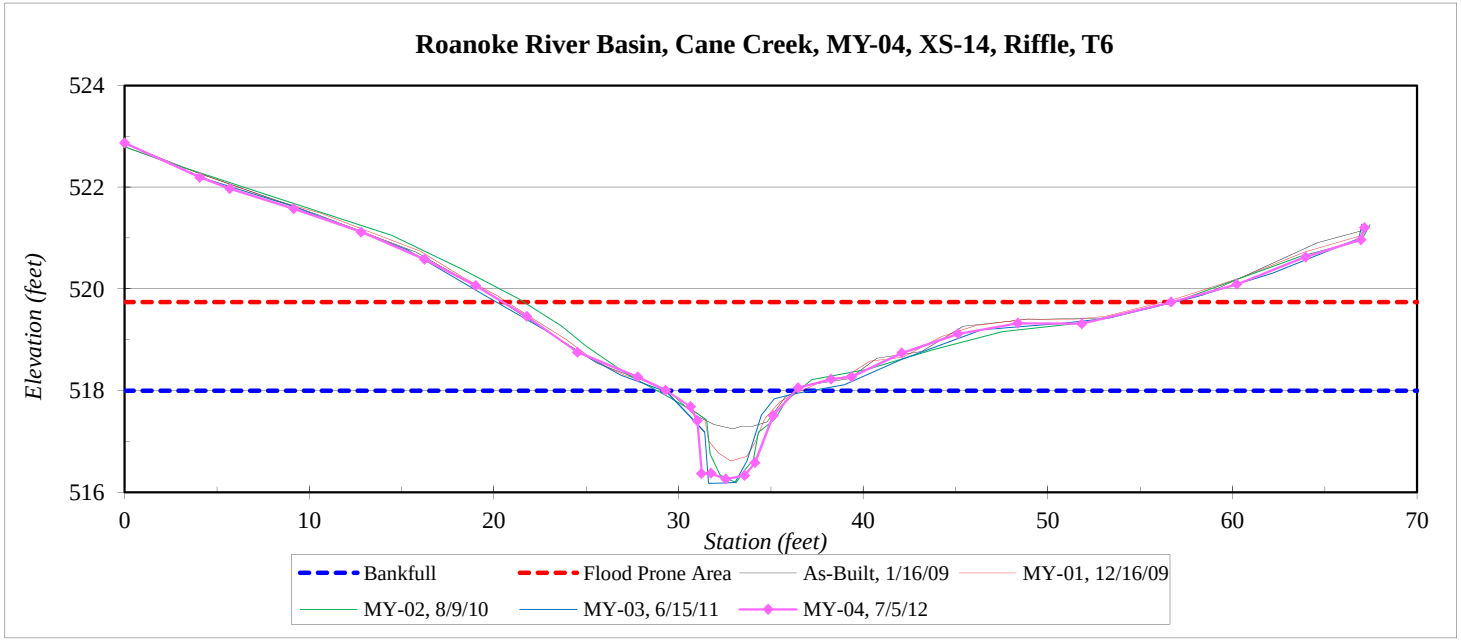


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-14, Riffle, T6
Drainage Area (sq mi):	0.07
Date:	7/16/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	522.87
4.1	522.20
5.7	521.97
9.2	521.58
12.8	521.12
16.2	520.58
19.0	520.07
21.8	519.45
24.5	518.75
27.8	518.27
29.3	518.00
30.7	517.68
31.0	517.41
31.3	516.37
31.8	516.37
32.6	516.26
33.6	516.33
34.1	516.58
35.1	517.51
36.5	518.06
38.3	518.22
39.4	518.27
42.1	518.74
45.1	519.12
48.4	519.33
51.8	519.31
56.7	519.74
60.2	520.09
64.0	520.63
67.0	520.97
67.2	521.20

SUMMARY DATA	
Bankfull Elevation:	518.0
Bankfull Cross-Sectional Area:	6.6
Bankfull Width:	7.0
Flood Prone Area Elevation:	519.7
Flood Prone Width:	35.0
Max Depth at Bankfull:	1.7
Mean Depth at Bankfull:	0.9
W / D Ratio:	7.4
Entrenchment Ratio:	5.0
Bank Height Ratio:	1.0

Stream Type	B4

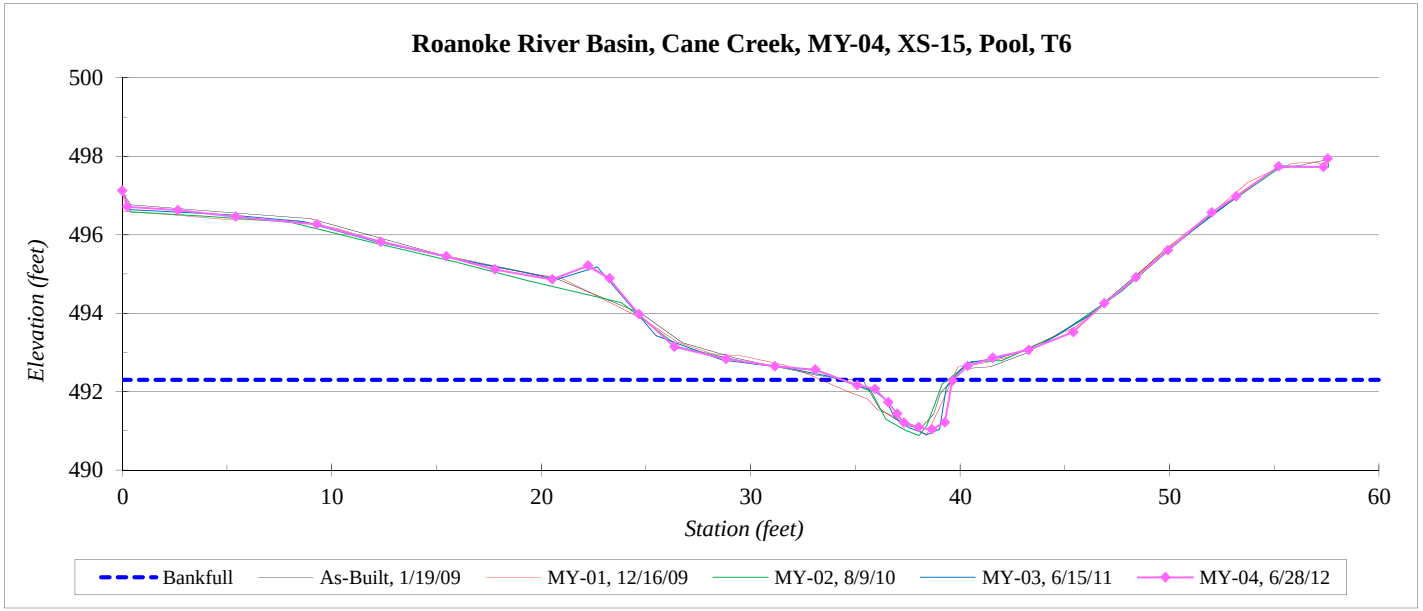


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-15, Pool, T6
Drainage Area (sq mi):	0.07
Date:	6/28/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	497.12
0.2	496.71
2.6	496.62
5.4	496.45
9.3	496.26
12.3	495.82
15.5	495.45
17.8	495.11
20.5	494.86
22.2	495.21
23.2	494.89
24.7	493.97
26.4	493.14
28.8	492.83
31.1	492.64
33.1	492.56
35.1	492.16
35.9	492.07
36.6	491.73
37.0	491.43
37.3	491.21
38.0	491.09
38.6	491.03
39.3	491.22
39.6	492.28
40.4	492.65
41.6	492.86
43.3	493.06
45.4	493.52
46.9	494.25
48.4	494.91
49.9	495.60
52.0	496.56
53.2	496.97
55.2	497.74
57.4	497.73
57.6	497.93

SUMMARY DATA	
Bankfull Elevation:	492.3
Bankfull Cross-Sectional Area:	3.6
Bankfull Width:	5.2
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	1.3
Mean Depth at Bankfull:	0.7
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-

Stream Type	B4

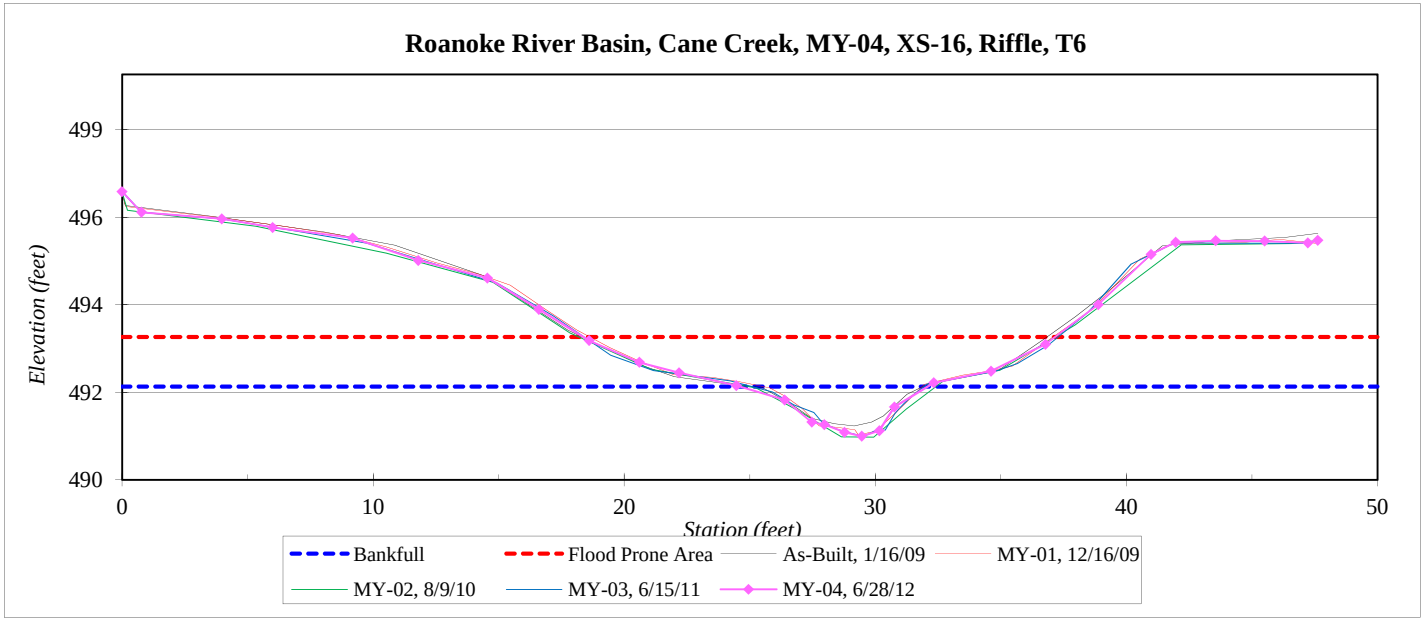


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-16, Riffle, T6
Drainage Area (sq mi):	0.07
Date:	6/28/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	497.11
0.8	496.60
4.0	496.44
6.0	496.23
9.2	495.96
11.8	495.42
14.6	494.98
16.6	494.20
18.6	493.44
20.6	492.90
22.2	492.64
24.5	492.33
26.4	491.97
27.5	491.42
28.0	491.37
28.8	491.17
29.5	491.07
30.2	491.21
30.8	491.80
32.3	492.39
34.6	492.68
36.8	493.34
38.9	494.33
41.0	495.57
42.0	495.87
43.6	495.90
45.5	495.89
47.2	495.85
47.6	495.91

SUMMARY DATA	
Bankfull Elevation:	492.3
Bankfull Cross-Sectional Area:	4.6
Bankfull Width:	7.5
Flood Prone Area Elevation:	493.5
Flood Prone Width:	19.0
Max Depth at Bankfull:	1.2
Mean Depth at Bankfull:	0.6
W / D Ratio:	12.2
Entrenchment Ratio:	2.5
Bank Height Ratio:	1.0

Stream Type	B4

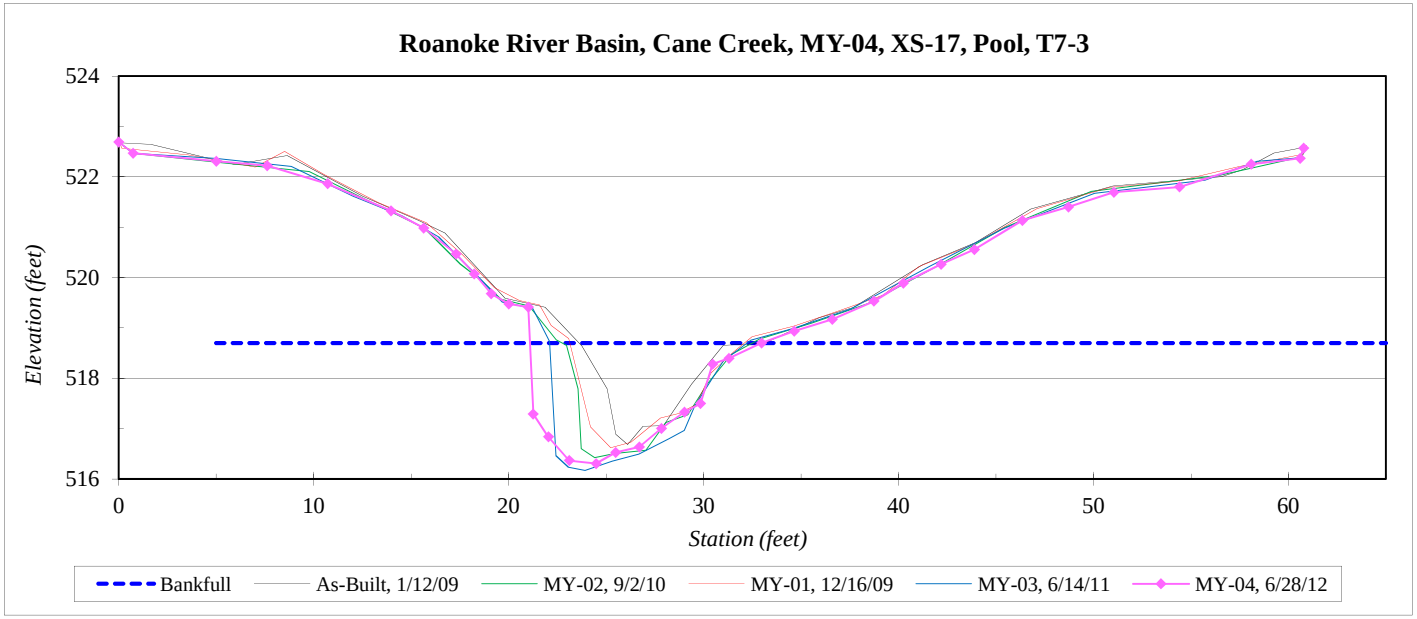


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-17, Pool, T7-3
Drainage Area (sq mi):	0.18
Date:	6/28/2012
Field Crew:	A. French, F. Davis

Station	Elevation
5.0	522.31
7.6	522.22
10.7	521.86
14.0	521.33
15.6	520.98
17.3	520.47
18.2	520.07
19.1	519.68
20.0	519.47
21.0	519.41
21.3	517.29
22.0	516.84
23.1	516.37
24.5	516.30
25.5	516.53
26.7	516.64
27.8	517.00
29.0	517.33
29.8	517.50
30.5	518.28
31.3	518.40
33.0	518.70
34.6	518.94
36.6	519.17
38.7	519.53
40.2	519.89
42.2	520.26
43.9	520.55
46.3	521.13
48.7	521.40
51.0	521.69
54.4	521.80
58.1	522.25
60.6	522.36
60.8	522.57

SUMMARY DATA	
Bankfull Elevation:	518.7
Bankfull Cross-Sectional Area:	17.3
Bankfull Width:	9.4
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	2.4
Mean Depth at Bankfull:	1.8
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-

Stream Type	B4c

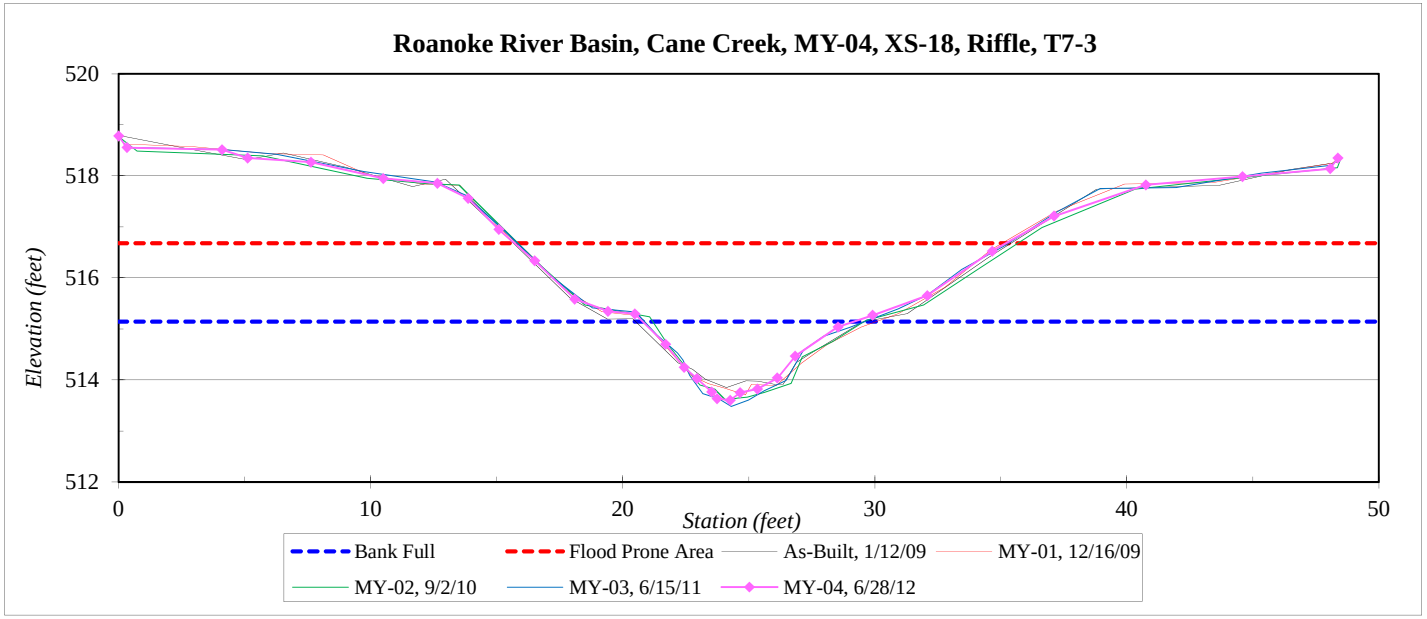


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-18, Riffle, T7-3
Drainage Area (sq mi):	0.18
Date:	6/28/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	518.78
0.3	518.55
4.1	518.52
5.1	518.35
7.6	518.27
10.5	517.95
12.6	517.85
13.9	517.56
15.1	516.95
16.5	516.34
18.1	515.58
19.4	515.34
20.5	515.30
21.7	514.70
22.4	514.25
22.9	514.03
23.5	513.76
23.7	513.63
24.3	513.60
24.7	513.75
25.3	513.82
26.1	514.04
26.8	514.47
28.5	515.04
29.9	515.27
32.1	515.65
34.7	516.52
37.1	517.21
40.8	517.82
44.6	517.98
48.1	518.14
48.4	518.35

SUMMARY DATA	
Bankfull Elevation:	515.1
Bankfull Cross-Sectional Area:	6.8
Bankfull Width:	8.4
Flood Prone Area Elevation:	516.7
Flood Prone Width:	21.0
Max Depth at Bankfull:	1.5
Mean Depth at Bankfull:	0.8
W / D Ratio:	10.4
Entrenchment Ratio:	2.5
Bank Height Ratio:	1.0

Stream Type	B4c

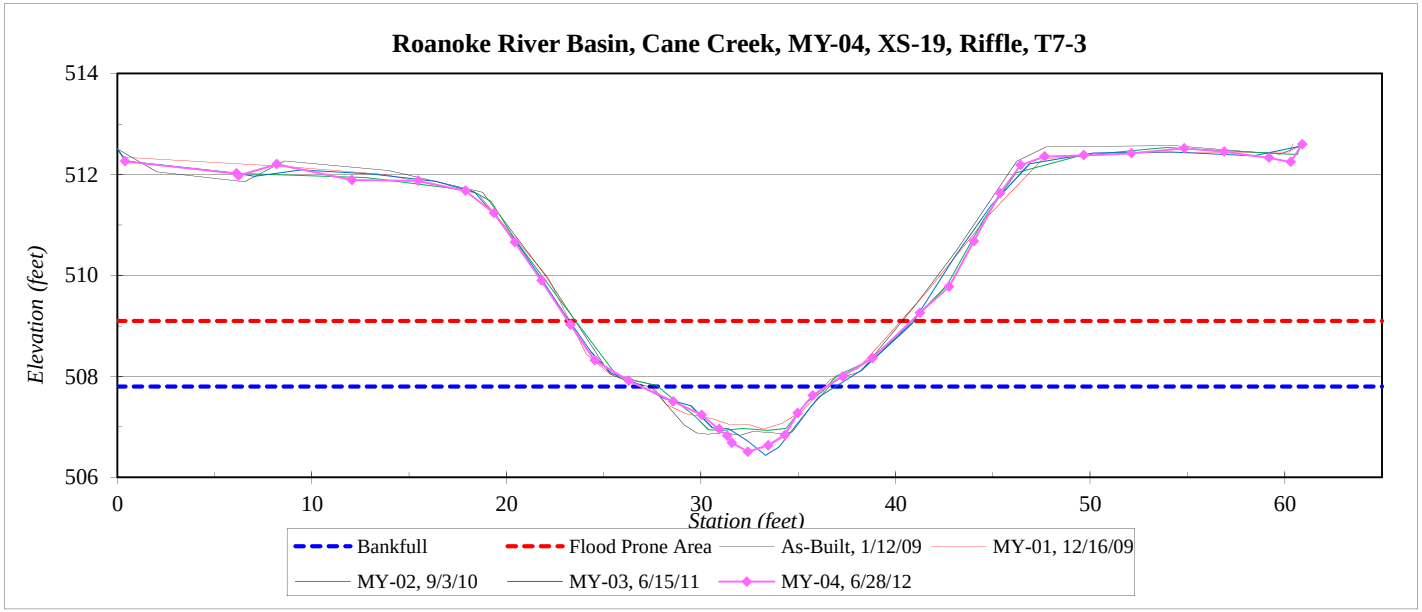


River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-19, Riffle, T7-3
Drainage Area (sq mi):	0.18
Date:	6/28/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	512.26
5.7	512.02
5.8	511.98
7.8	512.21
11.7	511.89
15.1	511.87
17.5	511.68
19.0	511.23
20.0	510.66
21.4	509.89
22.9	509.02
24.1	508.32
25.9	507.91
28.2	507.50
29.6	507.24
30.5	506.96
30.9	506.82
31.2	506.69
32.0	506.51
33.1	506.63
33.9	506.84
34.6	507.27
35.3	507.62
36.9	508.00
38.4	508.37
40.8	509.25
42.3	509.78
43.6	510.68
45.0	511.62
46.0	512.18
47.2	512.35
49.3	512.38
51.7	512.42
54.4	512.52
56.5	512.45
58.8	512.33
59.9	512.25
60.5	512.60

SUMMARY DATA	
Bankfull Elevation:	507.8
Bankfull Cross-Sectional Area:	6.1
Bankfull Width:	9.6
Flood Prone Area Elevation:	509.1
Flood Prone Width:	18.0
Max Depth at Bankfull:	1.3
Mean Depth at Bankfull:	0.6
W / D Ratio:	15.1
Entrenchment Ratio:	1.9
Bank Height Ratio:	1.0

Stream Type	B4c



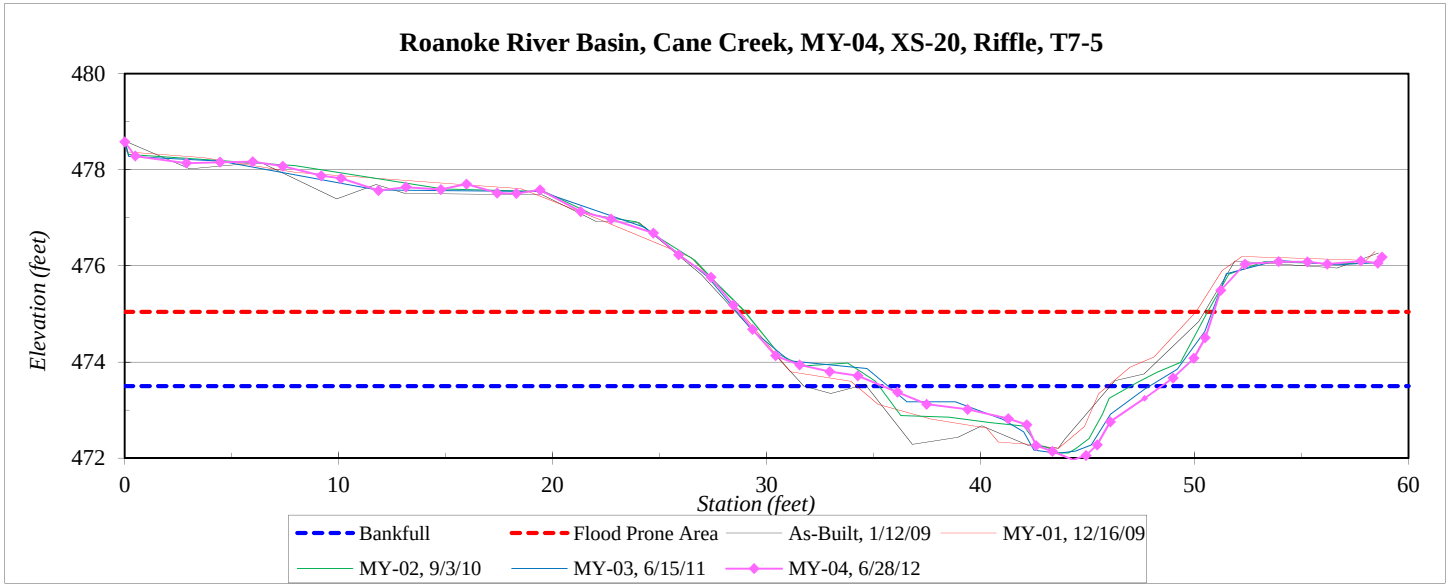
River Basin:	Roanoke
Watershed:	Cane Creek, MY-04
XS ID	XS-20, Riffle, T7-5
Drainage Area (sq mi):	0.26
Date:	6/28/2012
Field Crew:	A. French, F. Davis

Station	Elevation
0.0	478.58
0.5	478.28
2.9	478.14
4.5	478.16
6.0	478.17
7.4	478.07
9.2	477.88
10.1	477.82
11.9	477.57
13.1	477.64
14.8	477.59
16.0	477.70
17.4	477.51
18.3	477.51
19.4	477.58
21.3	477.13
22.7	476.97
24.7	476.68
25.9	476.23
27.4	475.76
28.4	475.18
29.3	474.68
30.4	474.13
31.5	473.94
32.9	473.80
34.3	473.71
36.1	473.37
37.5	473.1
39.4	473.0
41.3	472.8
42.2	472.7
42.6	472.3
43.4	472.1
44.3	472.0
44.9	472.1

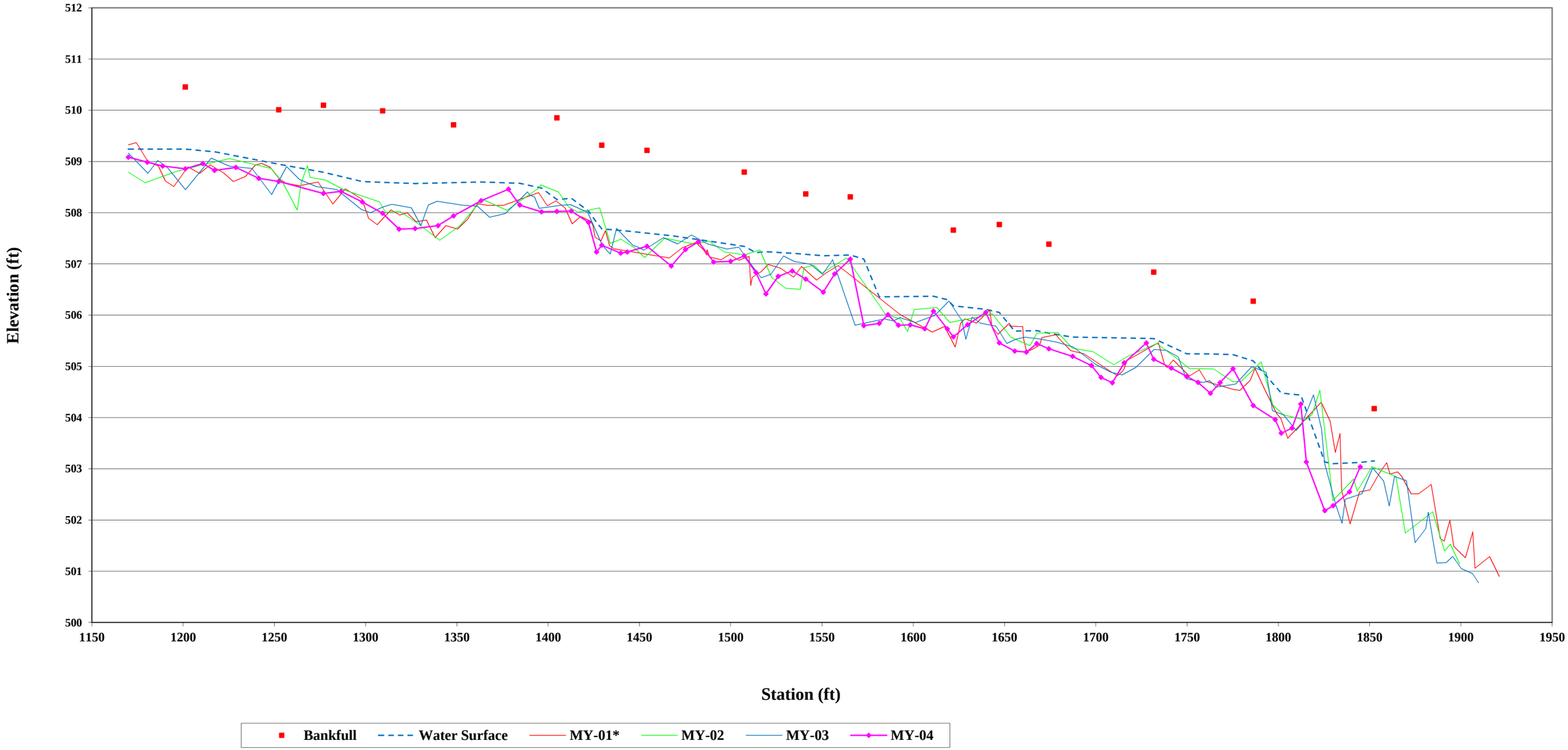
*Other shots not included due to space

SUMMARY DATA	
Bankfull Elevation:	473.5
Bankfull Cross-Sectional Area:	8.9
Bankfull Width:	13.1
Flood Prone Area Elevation:	475.0
Flood Prone Width:	23.0
Max Depth at Bankfull:	1.5
Mean Depth at Bankfull:	0.7
W / D Ratio:	19.3
Entrenchment Ratio:	1.8
Bank Height Ratio:	1.0

Stream Type	B4c/C4

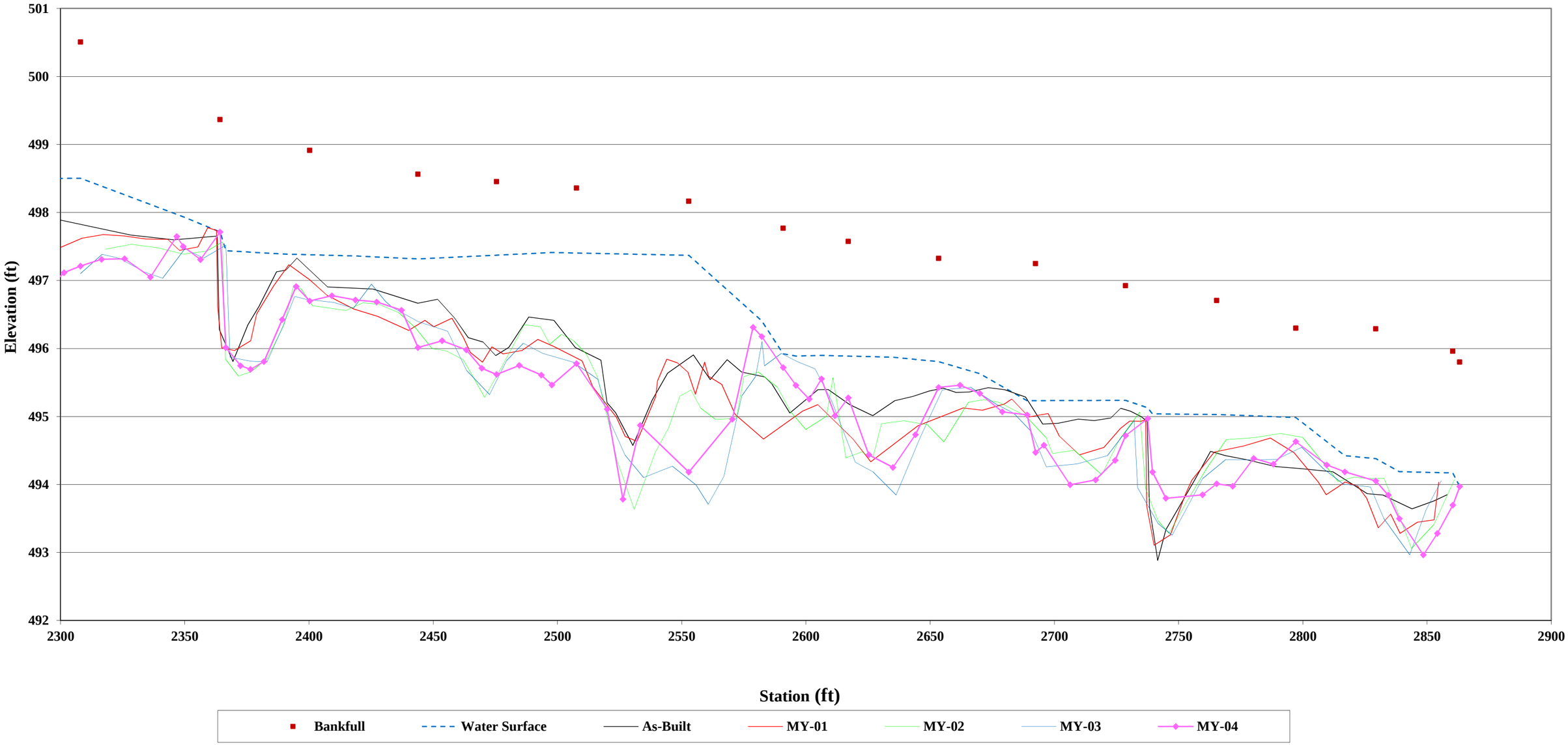


Cane Creek Tributary Site
Longitudinal Profile 1
Tributary 1, MY-04
Stations 11+70 - 19+10

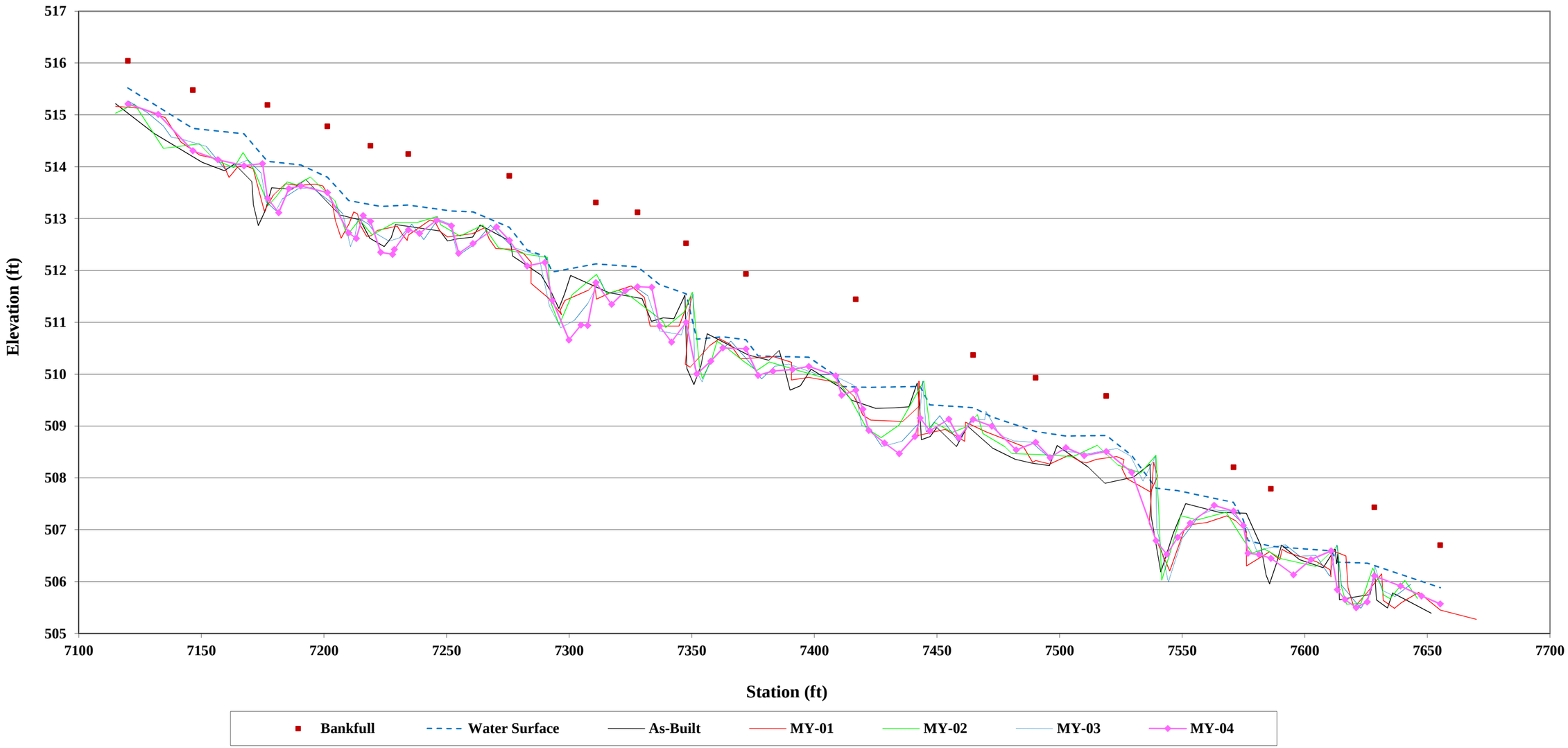


*Profile added during MY-01

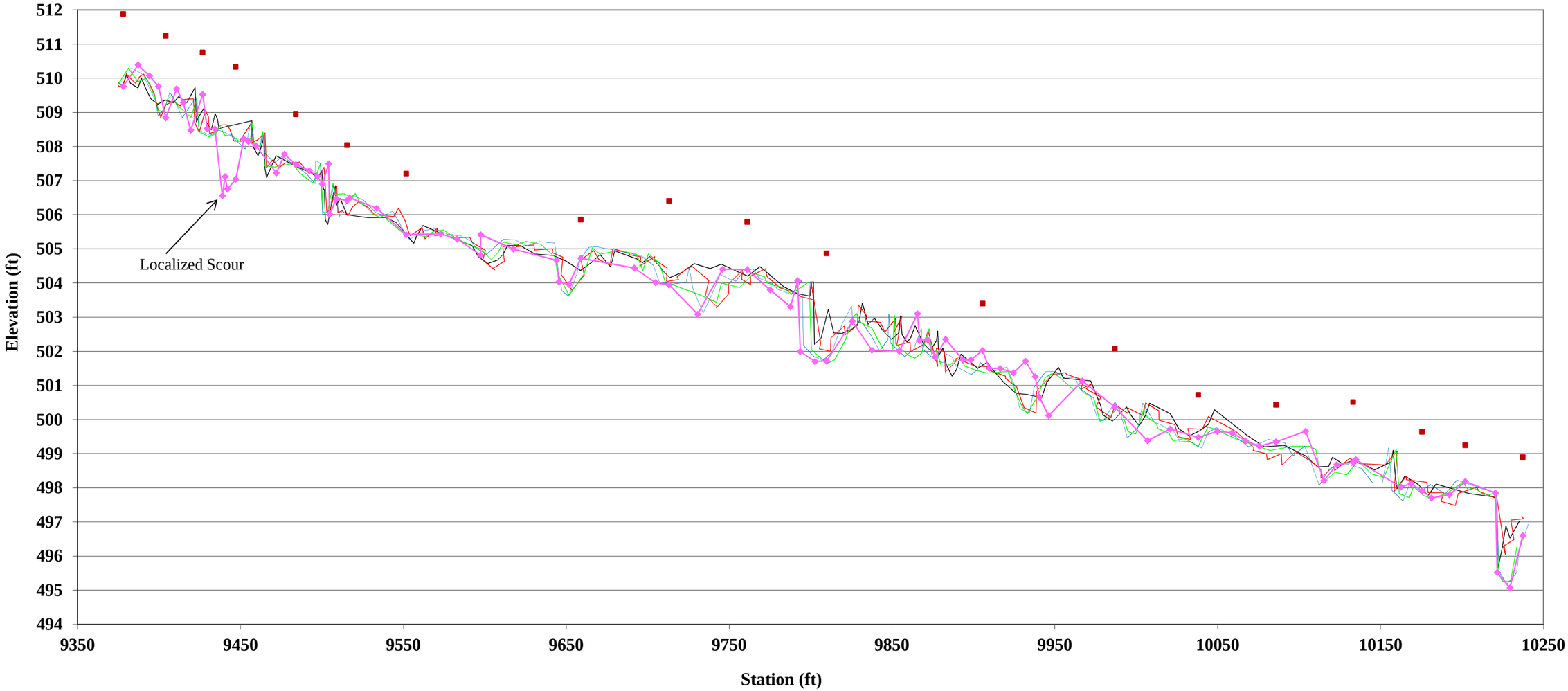
Cane Creek Tributary Site
Longitudinal Profile 2
Tributary 1, MY-04
Stations 23+18 - 28+66



Cane Creek Tributary Site
Longitudinal Profile
Tributary 3, MY-04
Stations 71+15 - 76+44

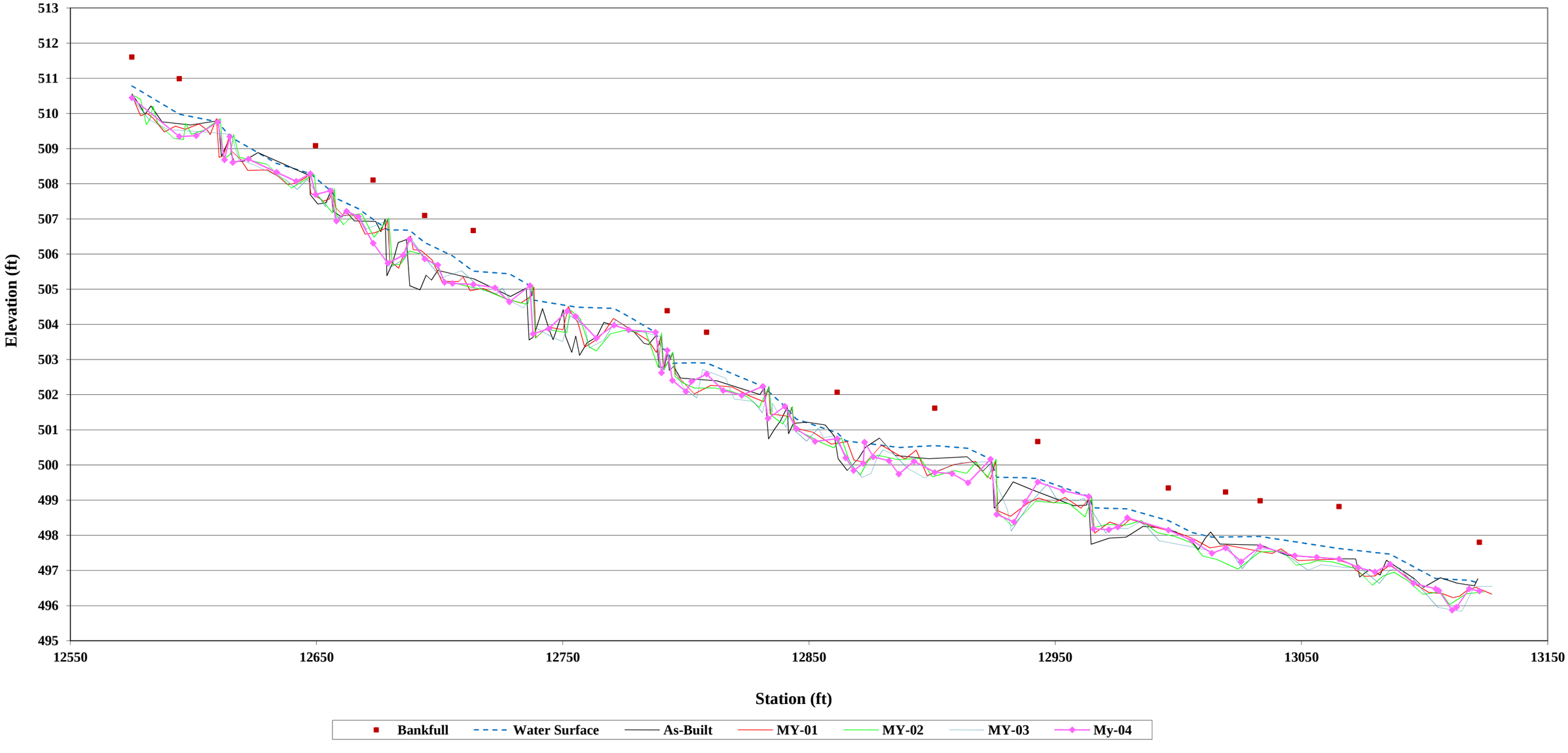


Cane Creek Tributary Site
Longitudinal Profile
Tributary 4, MY-04
Stations 93+75 - 102+33

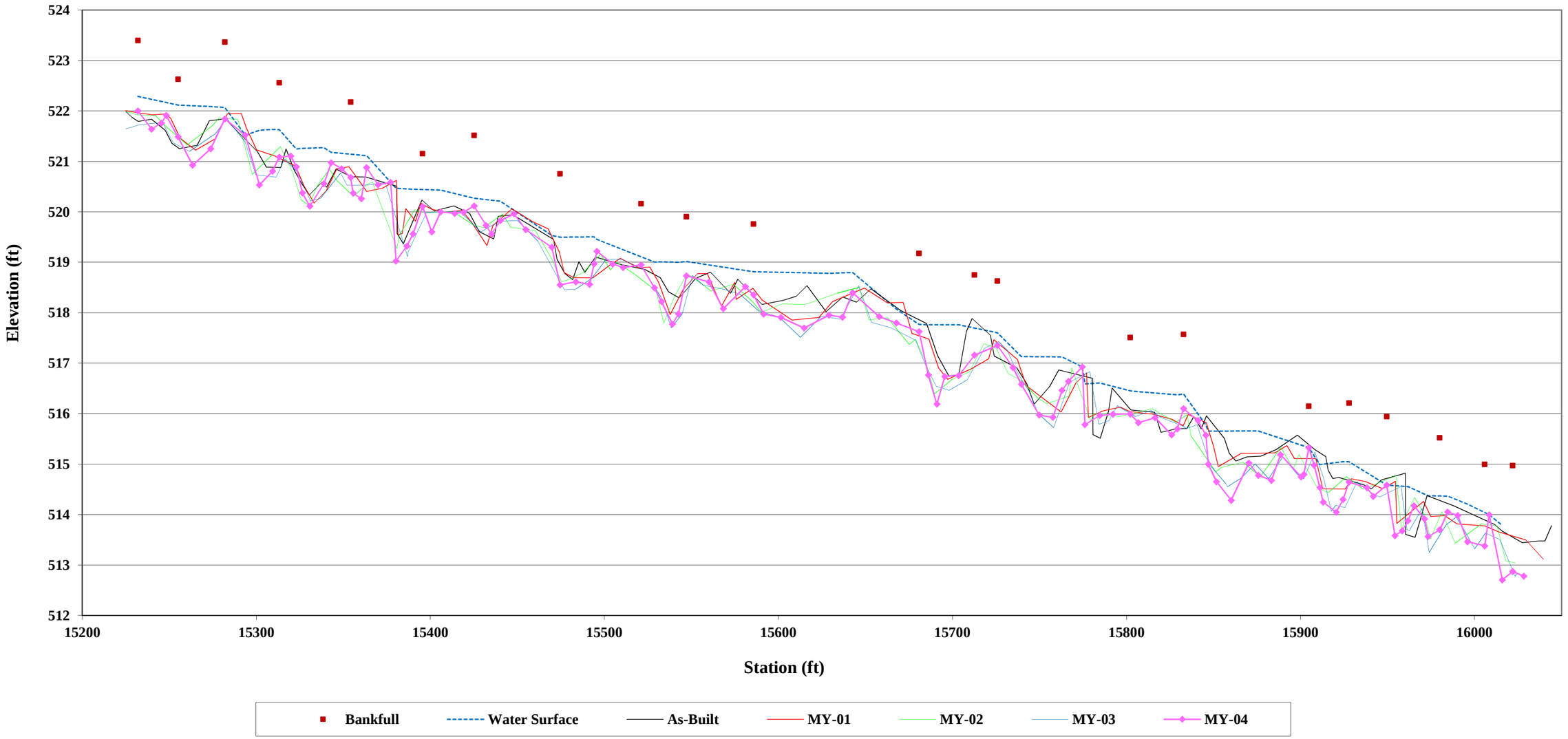


* No WS due to no flow in channel during survey

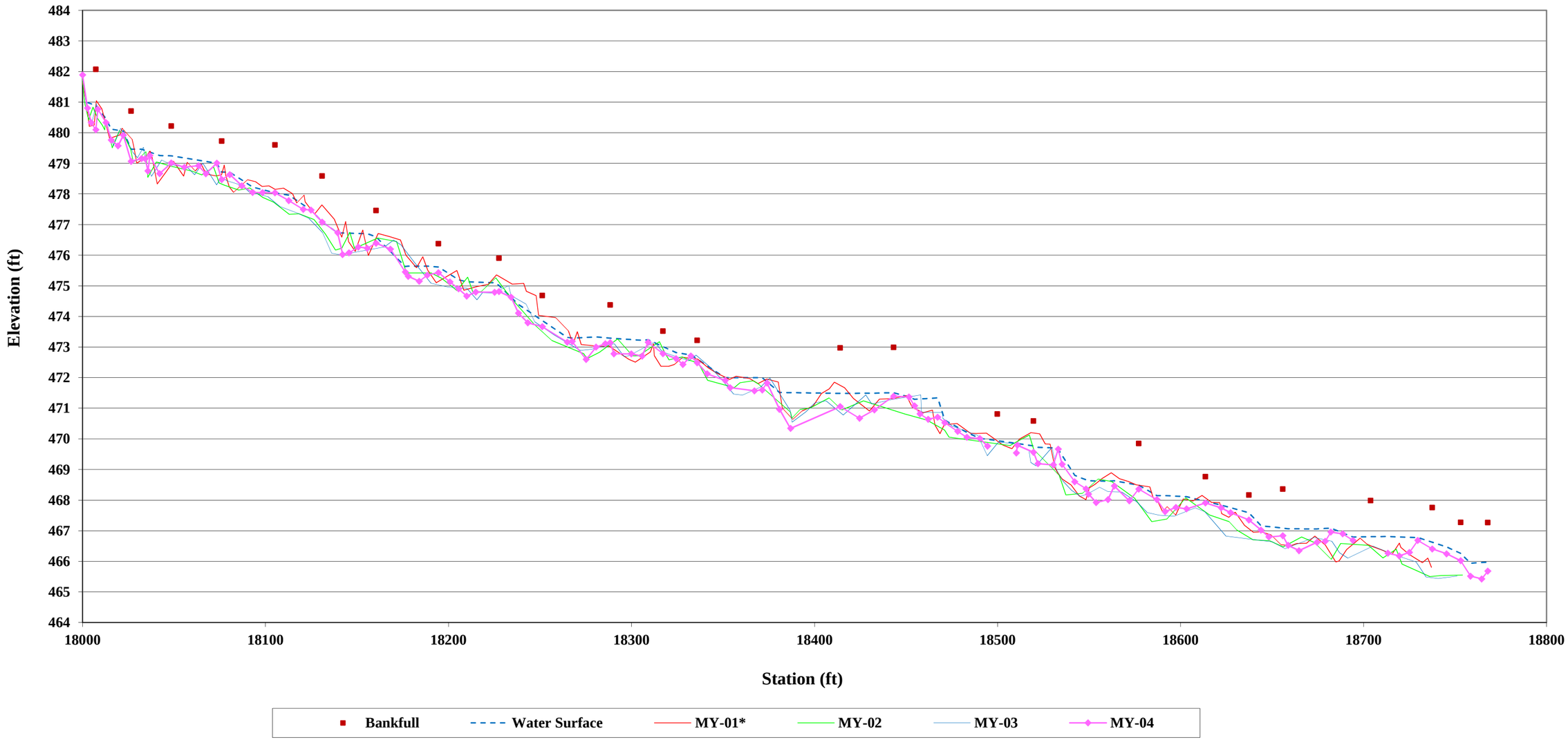
Cane Creek Tributary Site
Longitudinal Profile
Tributary 6, MY-04
Stations 125+75 - 131+28



Cane Creek Tributary Site
Longitudinal Profile 1
Tributary 7, MY-04
Stations 152+25 - 160+25



Cane Creek Tributary Site
Longitudinal Profile 2
Tributary 7, MY-04
Stations 180+00 - 187+37

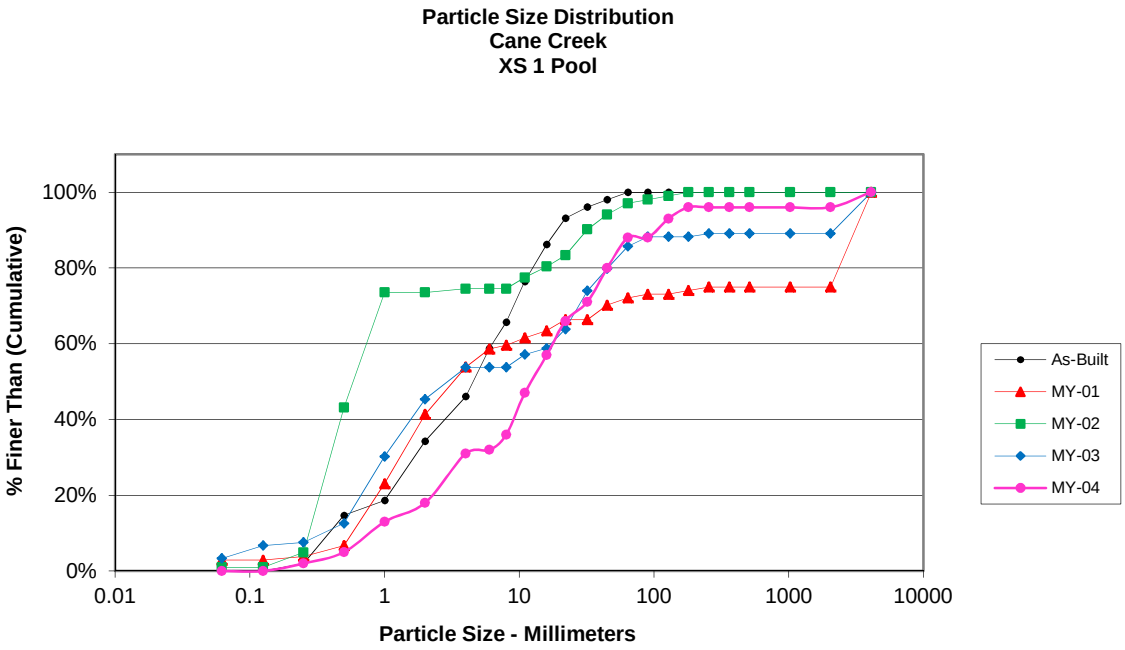


*Profile added during MY-01

Pebble Count Plots

Cross-Section 1 Pool - MY04, Trib 1			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	2
Medium	.25 - .50	N	3
Coarse	.50 - 1	D	8
Very Coarse	1 - 2	S	5
Very Fine	2 - 4		13
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	11
Medium	11.3 - 16	V	10
Coarse	16 - 22.6	E	9
Coarse	22.6 - 32	L	5
Very Coarse	32 - 45	S	9
Very Coarse	45 - 64		8
Small	64 - 90	C	
Small	90 - 128	O	5
Large	128 - 180	B	3
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	4
		Total	100

Note:



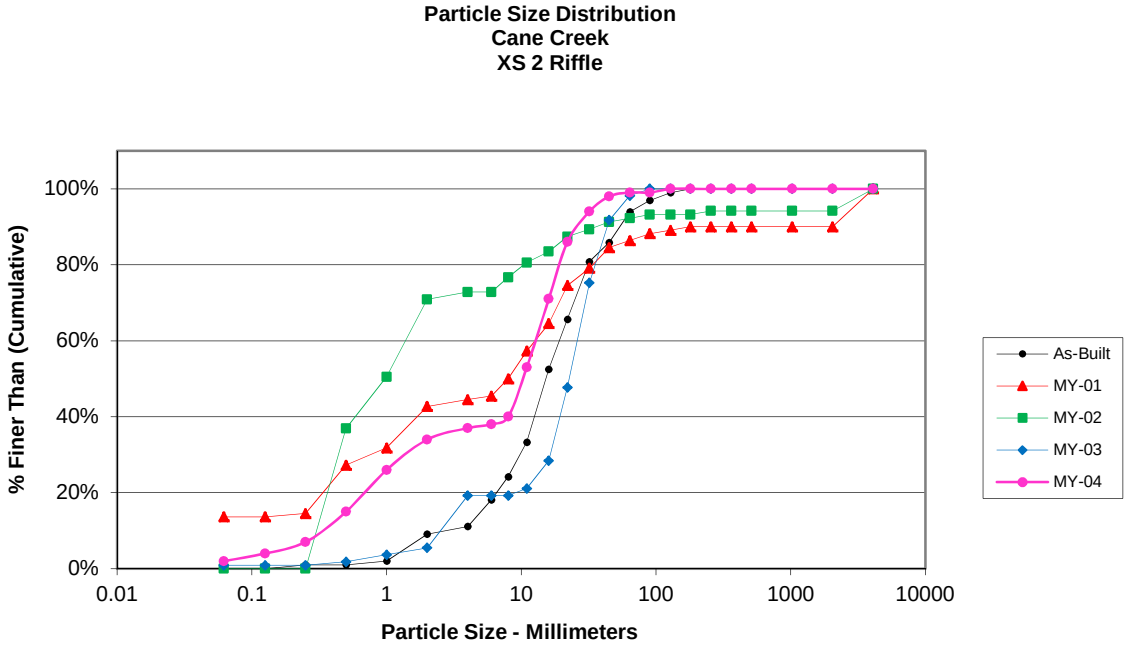
Size (mm)	
D16	1.5
D35	7.4
D50	12
D65	21
D84	54
D95	160

Size Distribution	
mean	9.0
dispersion	6.3
skewness	-0.10

Type	
silt/clay	0%
sand	18%
gravel	70%
cobble	8%
boulder	0%
bedrock	4%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 2 Riffle - MY04, Trib 1			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	2
Very Fine	.062 - .125	S	2
Fine	.125 - .25	A	3
Medium	.25 - .50	N	8
Coarse	.50 - 1	D	11
Very Coarse	1 - 2	S	8
Very Fine	2 - 4		3
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	2
Medium	8 - 11.3	A	13
Medium	11.3 - 16	V	18
Coarse	16 - 22.6	E	15
Coarse	22.6 - 32	L	8
Very Coarse	32 - 45	S	4
Very Coarse	45 - 64		1
Small	64 - 90	C	
Small	90 - 128	O	1
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



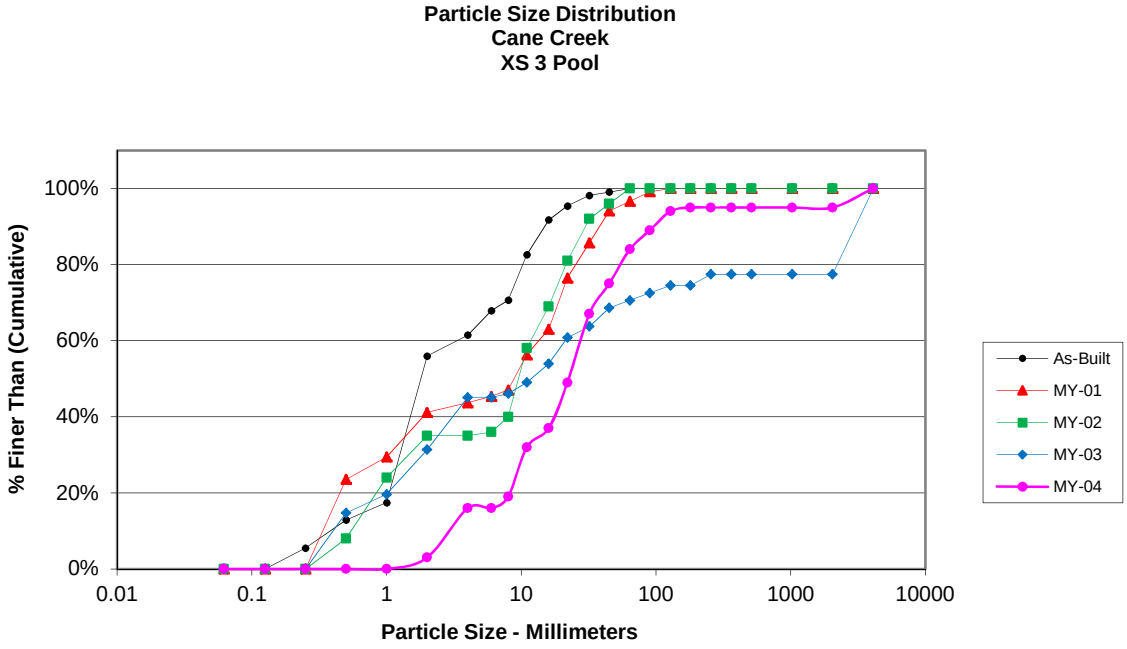
Size (mm)	
D16	0.53
D35	2.5
D50	10
D65	14
D84	21
D95	35

Size Distribution	
mean	3.3
dispersion	10.5
skewness	-0.38

Type	
silt/clay	2%
sand	32%
gravel	65%
cobble	1%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 3 Pool - MY04, Trib 1			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	3
Very Fine	2 - 4		13
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	13
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	12
Coarse	22.6 - 32	L	18
Very Coarse	32 - 45	S	8
Very Coarse	45 - 64		9
Small	64 - 90	C	5
Small	90 - 128	O	5
Large	128 - 180	B	1
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	5
		Total	100

Note:



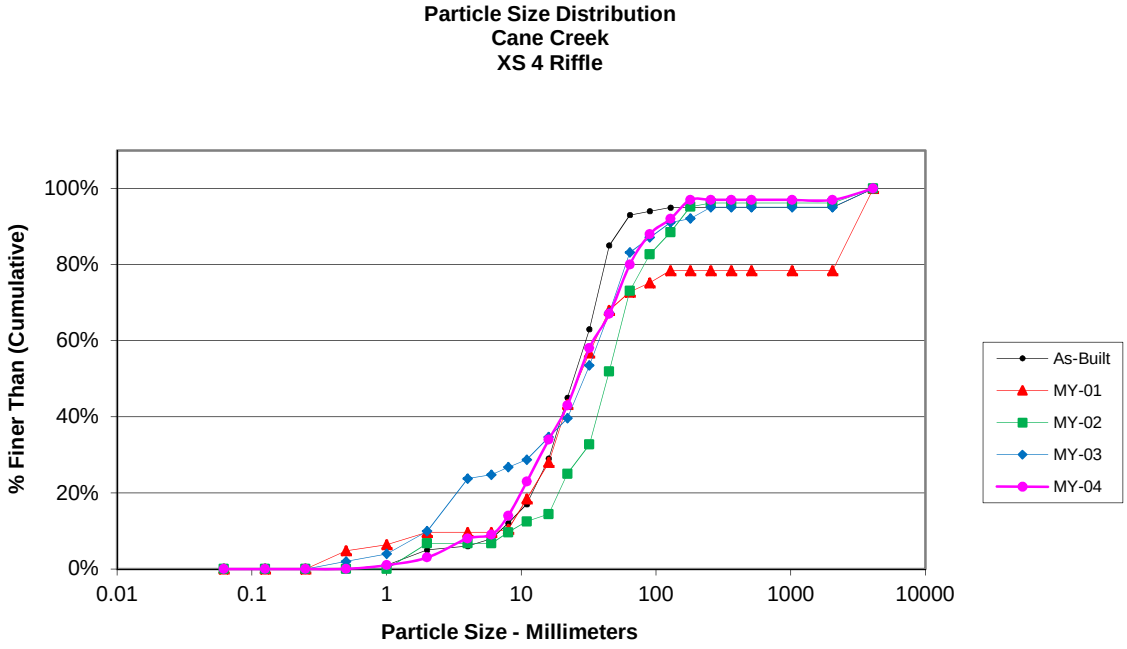
Size (mm)	
D16	6
D35	14
D50	22
D65	31
D84	64
D95	180

Size Distribution	
mean	19.6
dispersion	3.3
skewness	-0.05

Type	
silt/clay	0%
sand	3%
gravel	81%
cobble	11%
boulder	0%
bedrock	5%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 4 Riffle - MY04, Trib 1			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	1
Very Coarse	1 - 2	S	2
Very Fine	2 - 4		5
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	5
Medium	8 - 11.3	A	9
Medium	11.3 - 16	V	11
Coarse	16 - 22.6	E	9
Coarse	22.6 - 32	L	15
Very Coarse	32 - 45	S	9
Very Coarse	45 - 64		13
Small	64 - 90	C	8
Small	90 - 128	O	4
Large	128 - 180	B	5
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	3
		Total	100

Note:



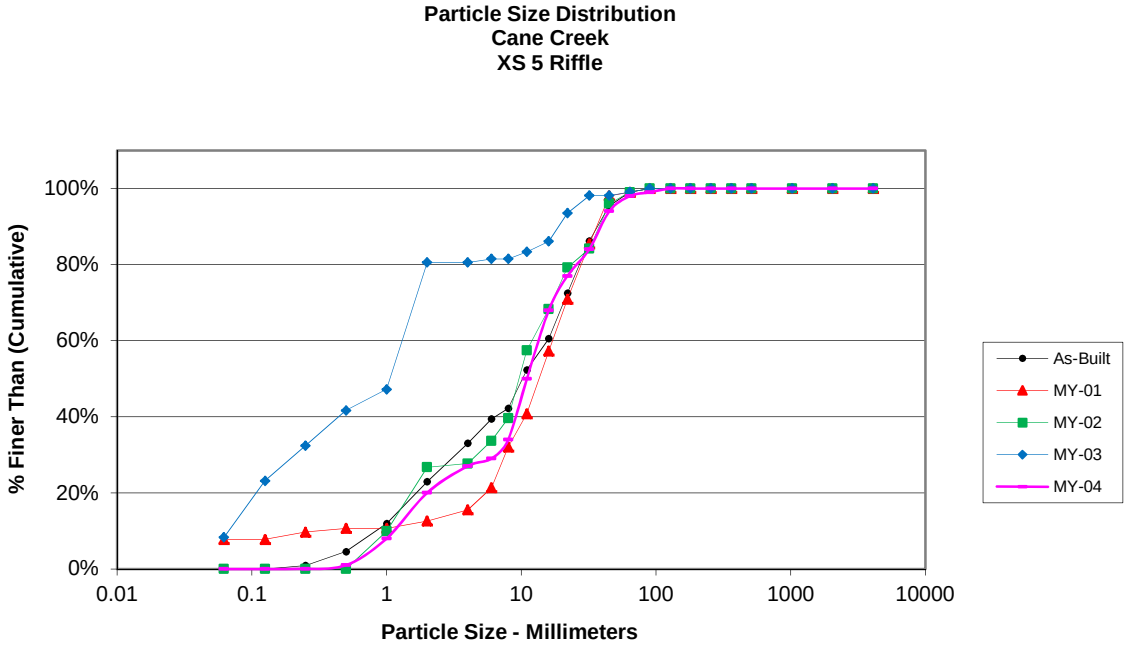
Size (mm)	
D16	8.6
D35	17
D50	26
D65	42
D84	76
D95	160

Size Distribution	
mean	25.6
dispersion	3.0
skewness	-0.01

Type	
silt/clay	0%
sand	3%
gravel	77%
cobble	17%
boulder	0%
bedrock	3%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 5 Riffle - MY04, Trib 2			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	1
Coarse	.50 - 1	D	7
Very Coarse	1 - 2	S	12
Very Fine	2 - 4		7
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	5
Medium	8 - 11.3	A	16
Medium	11.3 - 16	V	18
Coarse	16 - 22.6	E	9
Coarse	22.6 - 32	L	7
Very Coarse	32 - 45	S	10
Very Coarse	45 - 64		4
Small	64 - 90	C	1
Small	90 - 128	O	1
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



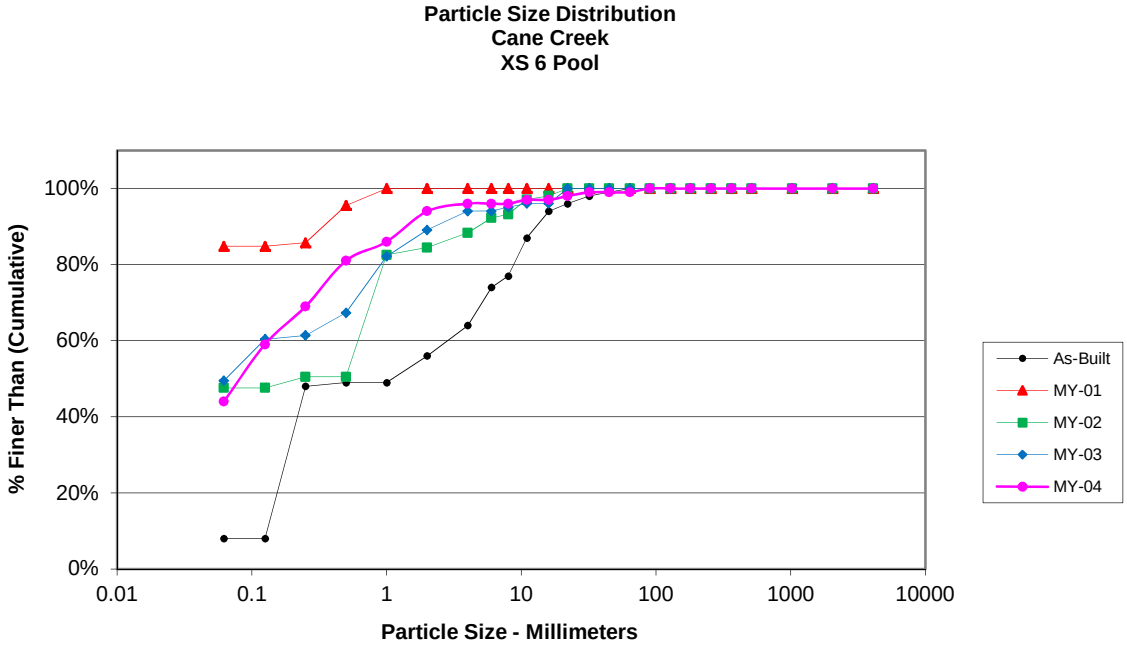
Size (mm)	
D16	1.6
D35	8.2
D50	11
D65	15
D84	32
D95	49

Size Distribution	
mean	7.2
dispersion	4.9
skewness	-0.16

Type	
silt/clay	0%
sand	20%
gravel	78%
cobble	2%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 6 Pool - MY04, Trib 3			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	44
Very Fine	.062 - .125	S	15
Fine	.125 - .25	A	10
Medium	.25 - .50	N	12
Coarse	.50 - 1	D	5
Very Coarse	1 - 2	S	8
Very Fine	2 - 4		2
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	1
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	1
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	1
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



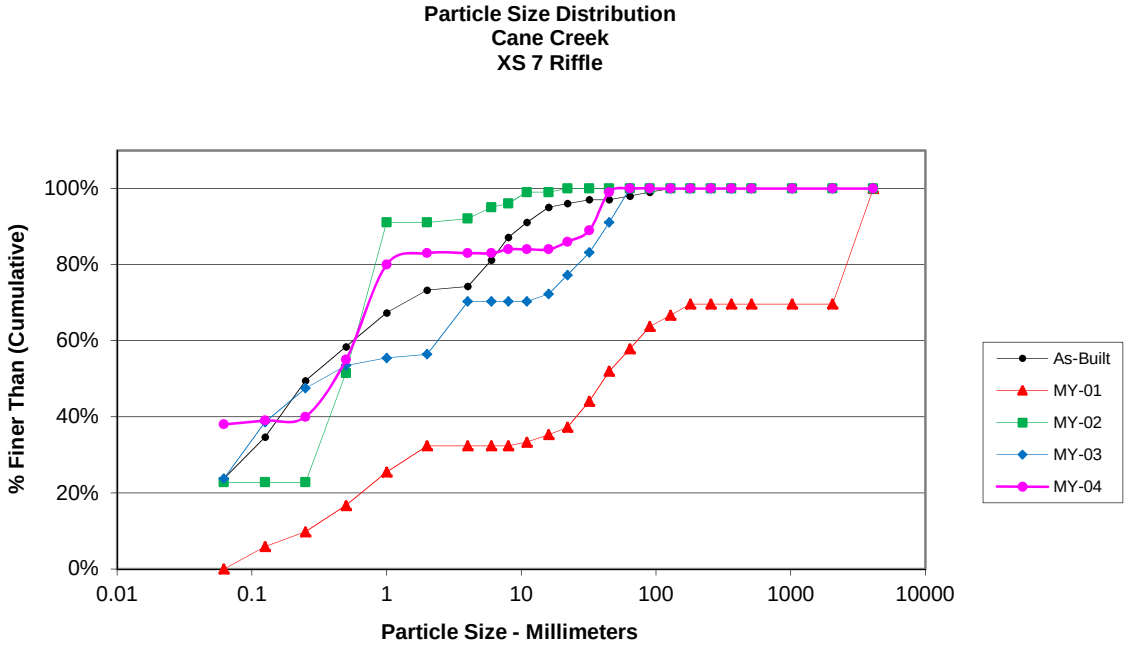
Size (mm)	
D16	0.062
D35	0.062
D50	0.082
D65	0.19
D84	0.76
D95	2.8

Size Distribution	
mean	0.2
dispersion	5.3
skewness	0.41

Type	
silt/clay	44%
sand	50%
gravel	5%
cobble	1%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 7 Riffle - MY04, Trib 3			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	38
Very Fine	.062 - .125	S	1
Fine	.125 - .25	A	1
Medium	.25 - .50	N	15
Coarse	.50 - 1	D	25
Very Coarse	1 - 2	S	3
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	10
Very Coarse	45 - 64		1
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



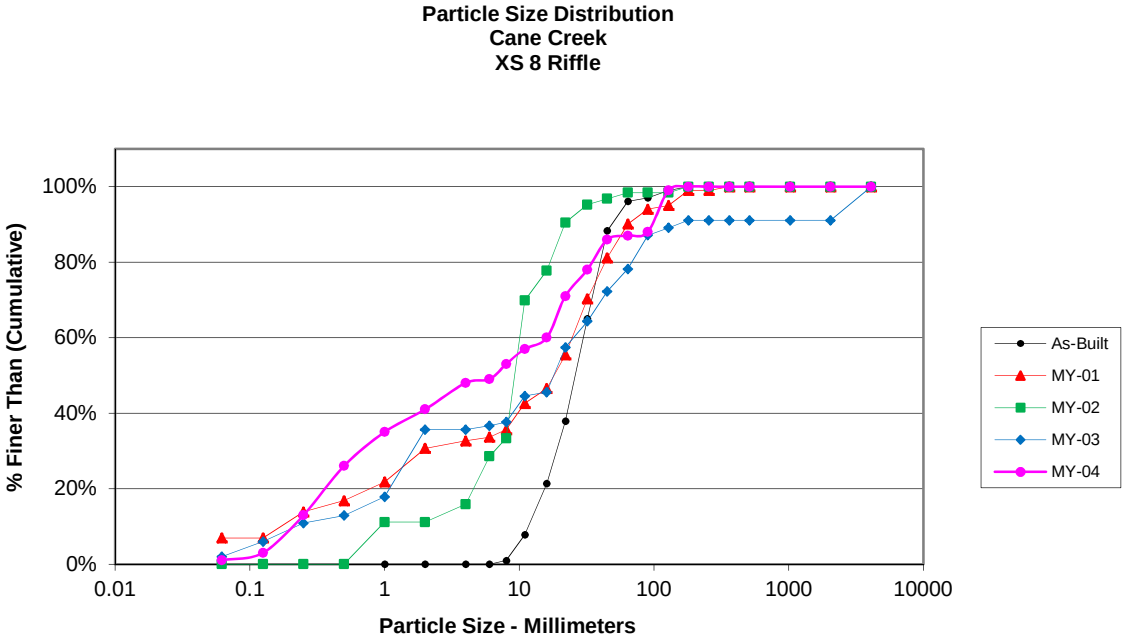
Size (mm)	
D16	0.062
D35	0.062
D50	0.41
D65	0.67
D84	18
D95	41

Size Distribution	
mean	1.1
dispersion	25.3
skewness	0.26

Type	
silt/clay	38%
sand	45%
gravel	17%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 8 Riffle - MY04, Trib 3			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	1
Very Fine	.062 - .125	S	2
Fine	.125 - .25	A	10
Medium	.25 - .50	N	13
Coarse	.50 - 1	D	9
Very Coarse	1 - 2	S	6
Very Fine	2 - 4		7
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	11
Coarse	22.6 - 32	L	7
Very Coarse	32 - 45	S	8
Very Coarse	45 - 64		1
Small	64 - 90	C	1
Small	90 - 128	O	11
Large	128 - 180	B	1
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



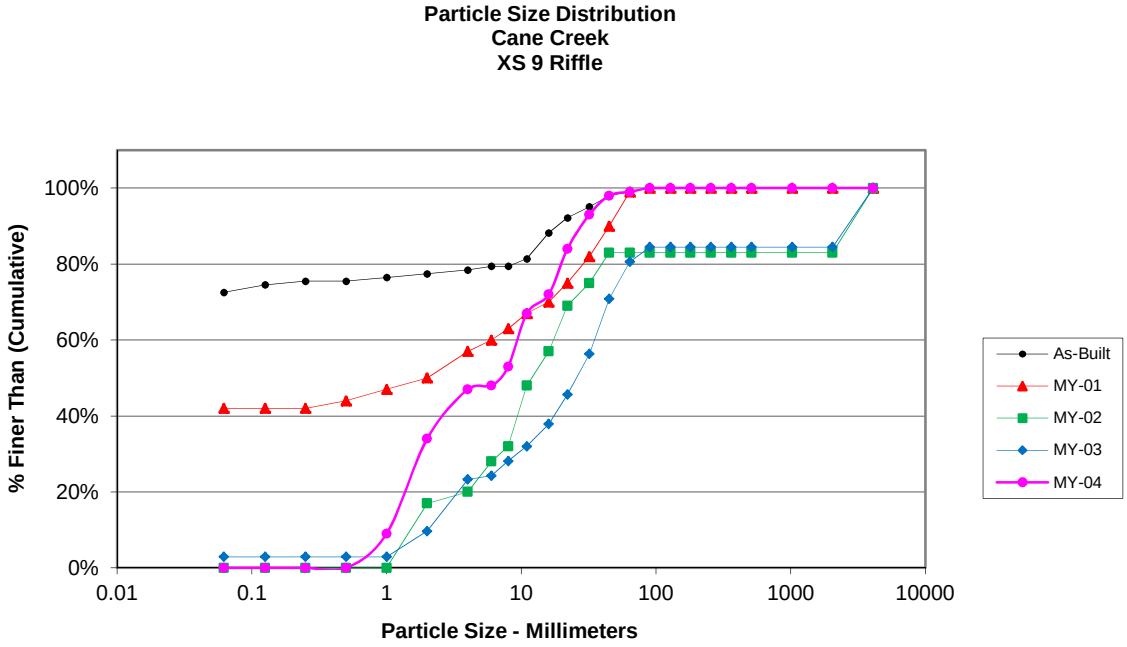
Size (mm)	
D16	0.29
D35	1
D50	6.4
D65	18
D84	41
D95	110

Size Distribution	
mean	3.4
dispersion	14.2
skewness	-0.18

Type	
silt/clay	1%
sand	40%
gravel	46%
cobble	13%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 9 Riffle - MY04, Trib 4			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	9
Very Coarse	1 - 2	S	25
Very Fine	2 - 4		13
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	5
Medium	8 - 11.3	A	14
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	12
Coarse	22.6 - 32	L	9
Very Coarse	32 - 45	S	5
Very Coarse	45 - 64		1
Small	64 - 90	C	1
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



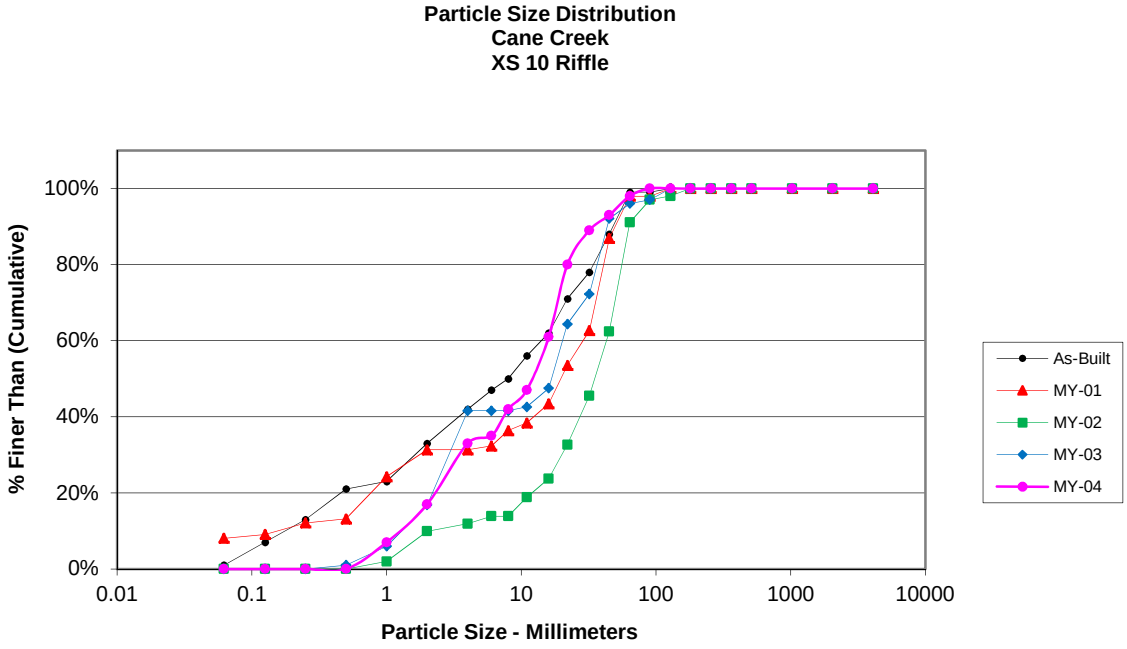
Size (mm)	
D16	1.2
D35	2.1
D50	6.7
D65	11
D84	22
D95	37

Size Distribution	
mean	5.1
dispersion	4.4
skewness	-0.10

Type	
silt/clay	0%
sand	34%
gravel	65%
cobble	1%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 10 Riffle - MY04, Trib 4			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	7
Very Coarse	1 - 2	S	10
Very Fine	2 - 4		16
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	7
Medium	8 - 11.3	A	5
Medium	11.3 - 16	V	14
Coarse	16 - 22.6	E	19
Coarse	22.6 - 32	L	9
Very Coarse	32 - 45	S	4
Very Coarse	45 - 64		5
Small	64 - 90	C	2
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



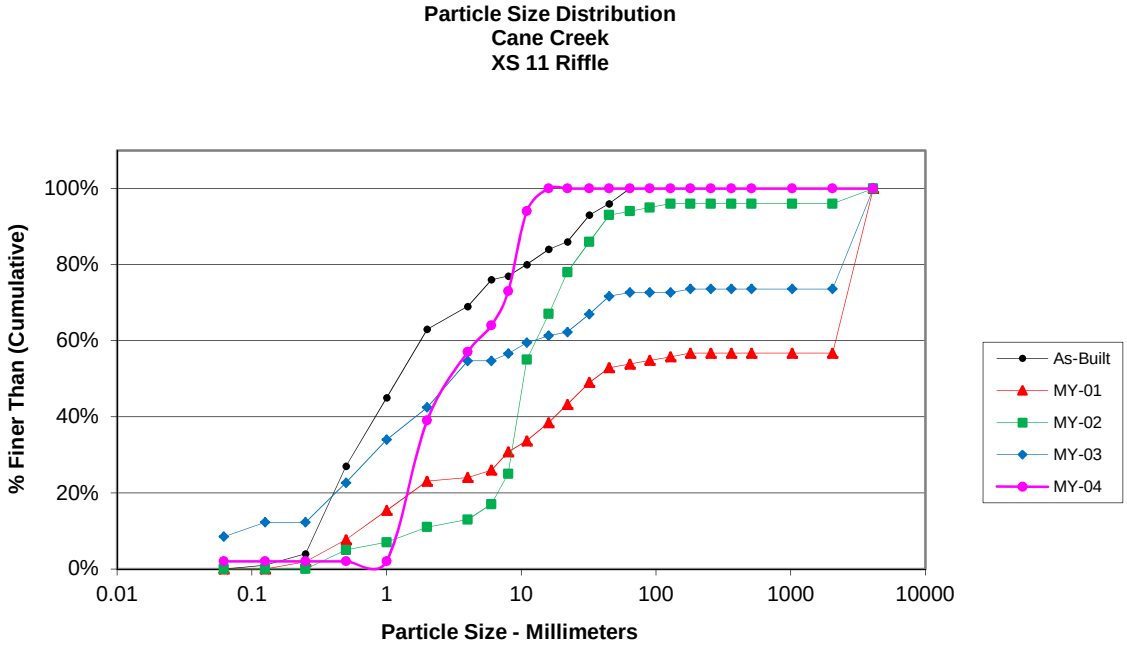
Size (mm)	
D16	1.9
D35	6
D50	12
D65	17
D84	26
D95	52

Size Distribution	
mean	7.0
dispersion	4.2
skewness	-0.22

Type	
silt/clay	0%
sand	17%
gravel	81%
cobble	2%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 11 Riffle - MY04, Trib 4			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	2
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	37
Very Fine	2 - 4		18
Fine	4 - 5.7	G	7
Fine	5.7 - 8	R	9
Medium	8 - 11.3	A	21
Medium	11.3 - 16	V	6
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



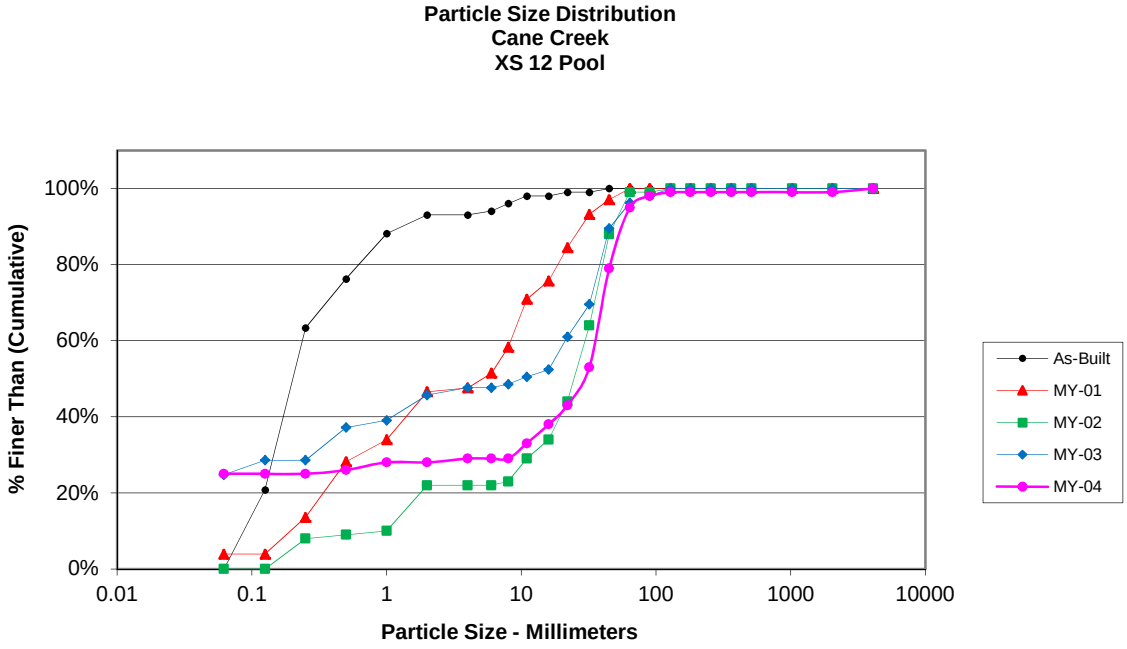
Size (mm)	
D16	1.3
D35	1.9
D50	3.1
D65	6.2
D84	9.5
D95	12

Size Distribution	
mean	3.5
dispersion	2.7
skewness	0.06

Type	
silt/clay	2%
sand	37%
gravel	61%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 12 Pool - MY04, Trib 4			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	25
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	1
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	
Very Fine	2 - 4		1
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	5
Coarse	22.6 - 32	L	10
Very Coarse	32 - 45	S	26
Very Coarse	45 - 64		16
Small	64 - 90	C	3
Small	90 - 128	O	1
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	1
		Total	100

Note:



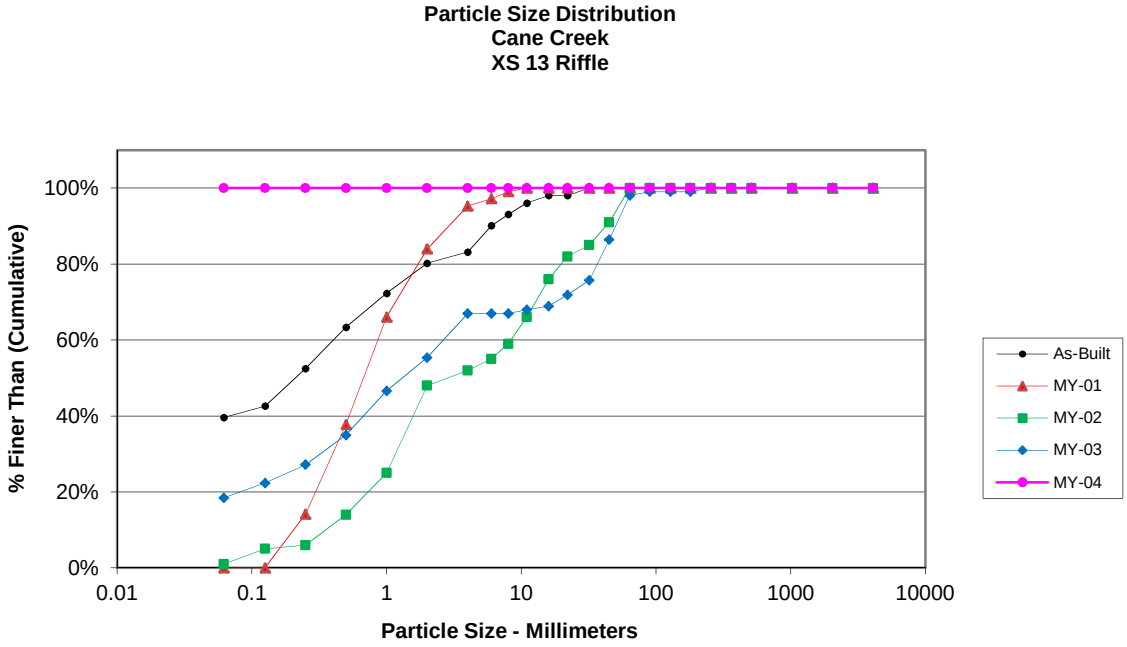
Size (mm)	
D16	0.062
D35	13
D50	29
D65	37
D84	50
D95	64

Size Distribution	
mean	1.8
dispersion	234.7
skewness	-0.71

Type	
silt/clay	25%
sand	3%
gravel	67%
cobble	4%
boulder	0%
bedrock	1%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 13 Riffle - MY04, Trib 5			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	100
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



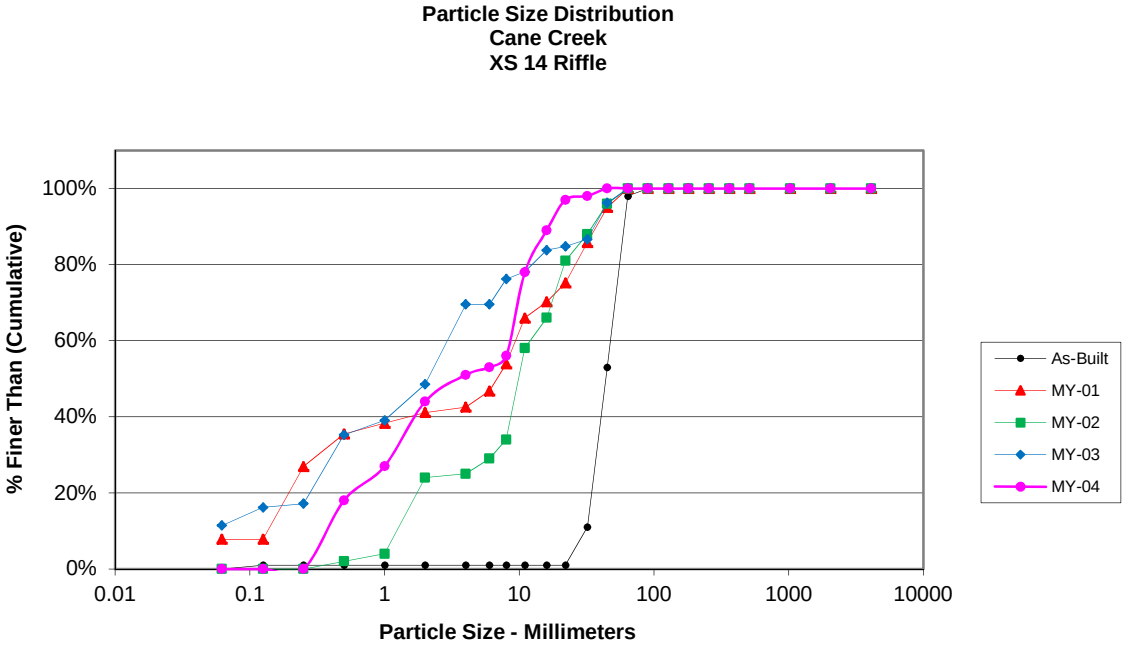
Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.062
D95	0.062

Size Distribution	
mean	0.1
dispersion	1.0
skewness	---

Type	
silt/clay	100%
sand	0%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 14 Riffle - MY04, Trib 6			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	18
Coarse	.50 - 1	D	9
Very Coarse	1 - 2	S	17
Very Fine	2 - 4		7
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	22
Medium	11.3 - 16	V	11
Coarse	16 - 22.6	E	8
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



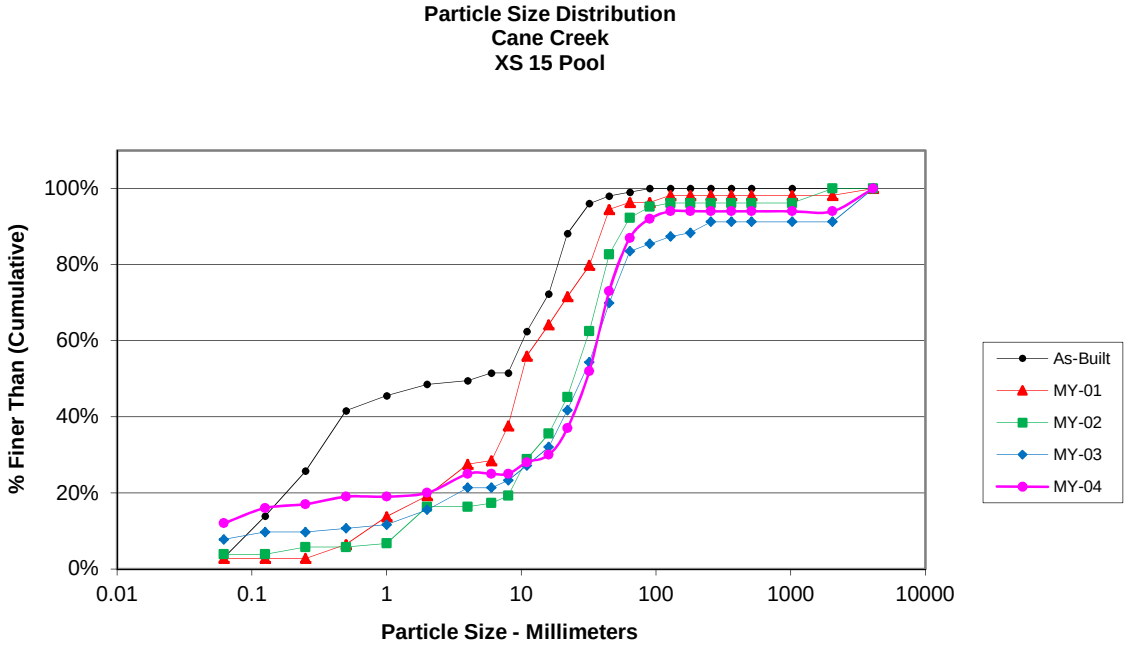
Size (mm)	
D16	0.46
D35	1.4
D50	3.6
D65	9.1
D84	13
D95	20

Size Distribution	
mean	2.4
dispersion	5.7
skewness	-0.14

Type	
silt/clay	0%
sand	44%
gravel	56%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 15 Pool - MY04, Trib 6			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	12
Very Fine	.062 - .125	S	4
Fine	.125 - .25	A	1
Medium	.25 - .50	N	2
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	1
Very Fine	2 - 4		5
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	2
Coarse	16 - 22.6	E	7
Coarse	22.6 - 32	L	15
Very Coarse	32 - 45	S	21
Very Coarse	45 - 64		14
Small	64 - 90	C	5
Small	90 - 128	O	2
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	6
		Total	100

Note:



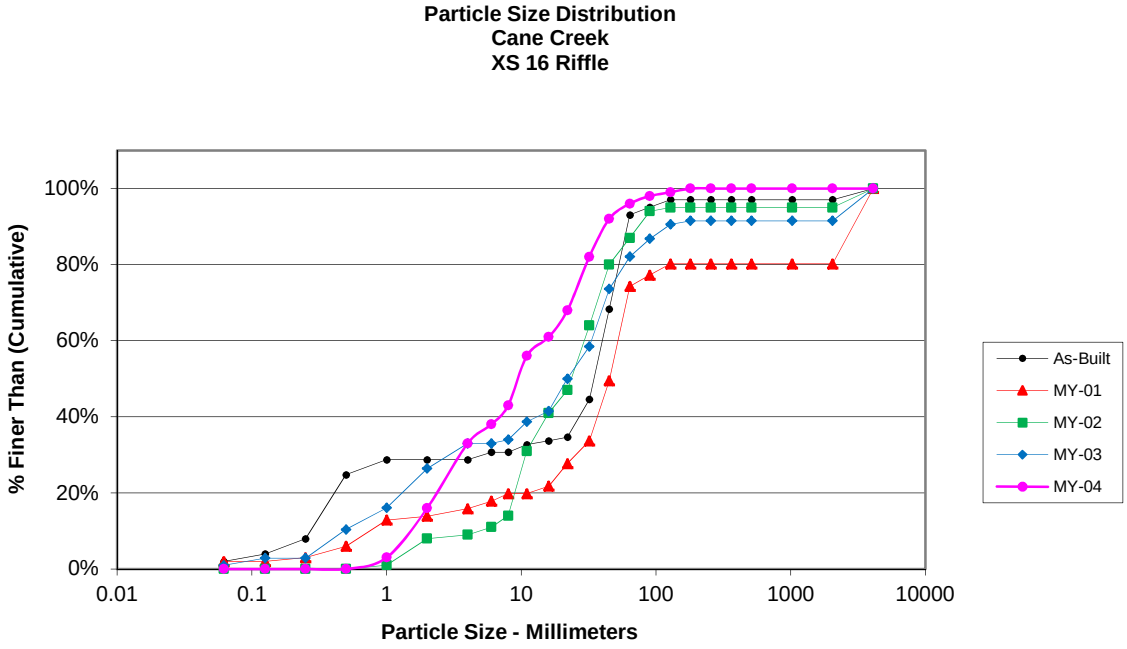
Size (mm)	
D16	0.13
D35	20
D50	30
D65	40
D84	59
D95	2300

Size Distribution	
mean	2.8
dispersion	116.4
skewness	-0.63

Type	
silt/clay	12%
sand	8%
gravel	67%
cobble	7%
boulder	0%
bedrock	6%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 16 Riffle - MY04, Trib 6			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	13
Very Fine	2 - 4		17
Fine	4 - 5.7	G	5
Fine	5.7 - 8	R	5
Medium	8 - 11.3	A	13
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	7
Coarse	22.6 - 32	L	14
Very Coarse	32 - 45	S	10
Very Coarse	45 - 64		4
Small	64 - 90	C	2
Small	90 - 128	O	1
Large	128 - 180	B	1
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



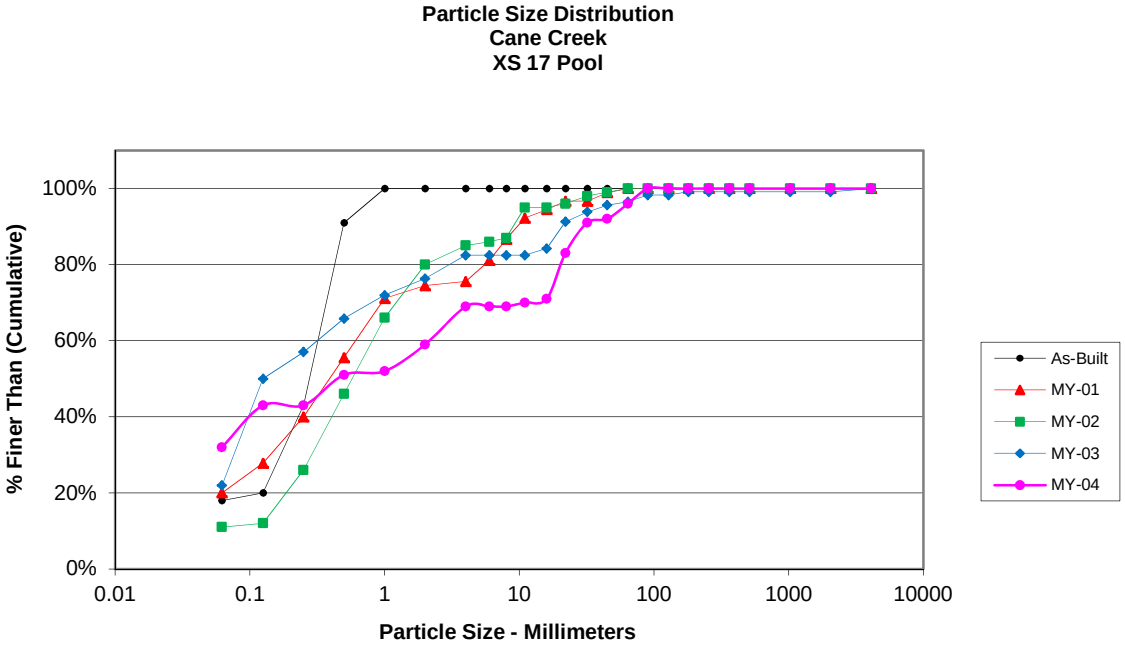
Size (mm)	
D16	2
D35	4.7
D50	9.5
D65	19
D84	34
D95	59

Size Distribution	
mean	8.2
dispersion	4.2
skewness	-0.06

Type	
silt/clay	0%
sand	16%
gravel	80%
cobble	4%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 17 Pool - MY04, Trib 7			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	32
Very Fine	.062 - .125	S	11
Fine	.125 - .25	A	
Medium	.25 - .50	N	8
Coarse	.50 - 1	D	1
Very Coarse	1 - 2	S	7
Very Fine	2 - 4		10
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	1
Medium	11.3 - 16	V	1
Coarse	16 - 22.6	E	12
Coarse	22.6 - 32	L	8
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		4
Small	64 - 90	C	4
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



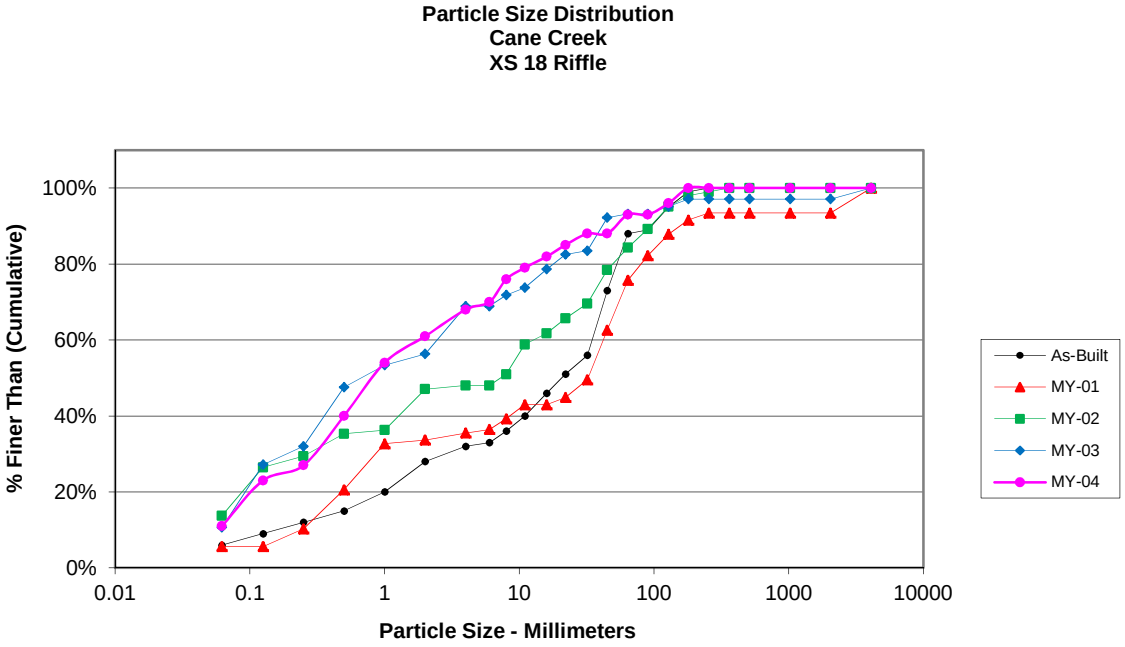
Size (mm)	
D16	0.062
D35	0.075
D50	0.46
D65	3
D84	23
D95	59

Size Distribution	
mean	1.2
dispersion	28.7
skewness	0.26

Type	
silt/clay	32%
sand	27%
gravel	37%
cobble	4%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 18 Riffle - MY04, Trib 7			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	11
Very Fine	.062 - .125	S	12
Fine	.125 - .25	A	4
Medium	.25 - .50	N	13
Coarse	.50 - 1	D	14
Very Coarse	1 - 2	S	7
Very Fine	2 - 4		7
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	6
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	3
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		5
Small	64 - 90	C	
Small	90 - 128	O	3
Large	128 - 180	B	4
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



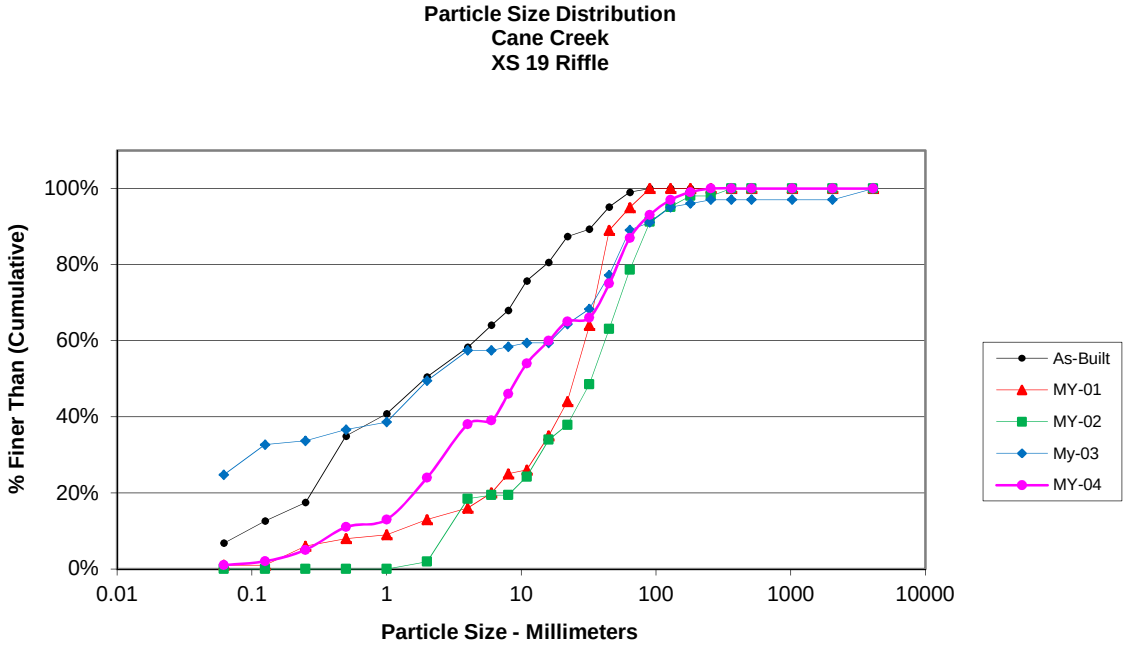
Size (mm)	
D16	0.083
D35	0.38
D50	0.82
D65	3
D84	20
D95	110

Size Distribution	
mean	1.3
dispersion	17.1
skewness	0.13

Type	
silt/clay	11%
sand	50%
gravel	32%
cobble	7%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 19 Riffle - MY04, Trib 7			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	1
Very Fine	.062 - .125	S	1
Fine	.125 - .25	A	3
Medium	.25 - .50	N	6
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	11
Very Fine	2 - 4		14
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	7
Medium	8 - 11.3	A	8
Medium	11.3 - 16	V	6
Coarse	16 - 22.6	E	5
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	9
Very Coarse	45 - 64		12
Small	64 - 90	C	6
Small	90 - 128	O	4
Large	128 - 180	B	2
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



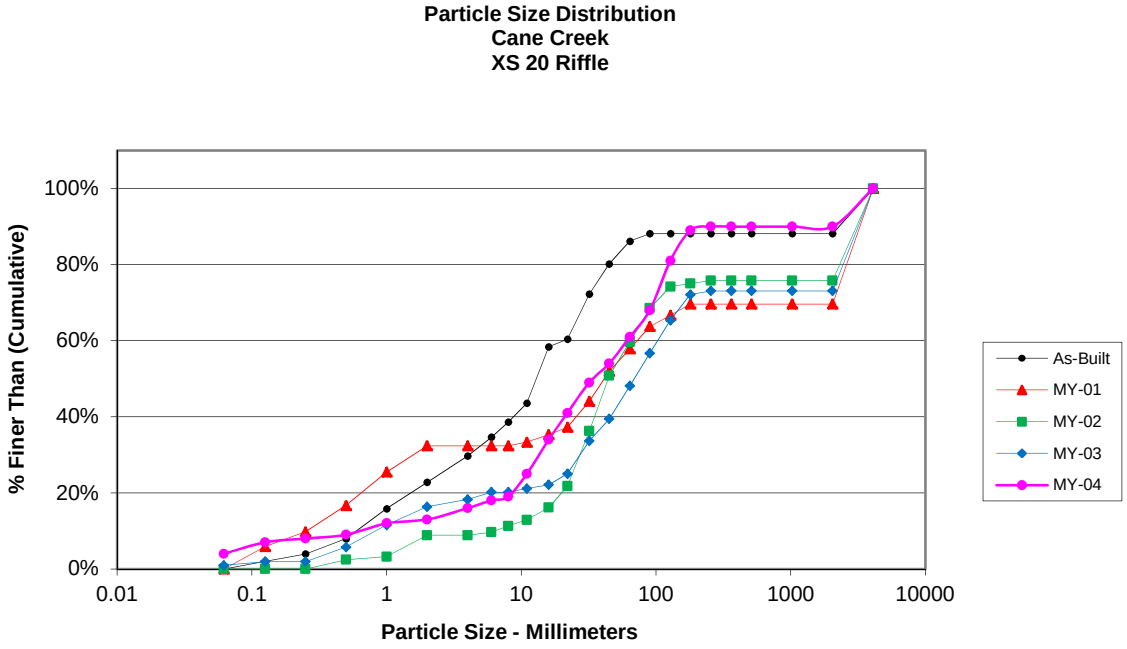
Size (mm)	
D16	1.2
D35	3.4
D50	9.4
D65	22
D84	59
D95	110

Size Distribution	
mean	8.4
dispersion	7.1
skewness	-0.04

Type	
silt/clay	1%
sand	23%
gravel	63%
cobble	13%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 20 Riffle - MY04, Trib 7			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	4
Very Fine	.062 - .125	S	3
Fine	.125 - .25	A	1
Medium	.25 - .50	N	1
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	1
Very Fine	2 - 4		3
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	6
Medium	11.3 - 16	V	9
Coarse	16 - 22.6	E	7
Coarse	22.6 - 32	L	8
Very Coarse	32 - 45	S	5
Very Coarse	45 - 64		7
Small	64 - 90	C	7
Small	90 - 128	O	13
Large	128 - 180	B	8
Very Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	10
		Total	100

Note:



Size (mm)	
D16	4
D35	17
D50	34
D65	78
D84	150
D95	2900

Size Distribution	
mean	24.5
dispersion	6.5
skewness	-0.11

Type	
silt/clay	4%
sand	9%
gravel	48%
cobble	29%
boulder	0%
bedrock	10%
hardpan	0%
wood/det	0%
artificial	0%

Appendix C
Stream Photos

PP#1U – MY04 – 12/13/12

PP#1D – MY04 – 12/13/12

PP#2U – MY04 – 12/13/12

PP#2D – MY04 – 12/13/12

PP#3U – MY04 – 12/13/12

PP#3D – MY04 – 12/13/12

PP#4U – MY04 – 12/13/12

PP#4D – MY04 – 12/13/12

PP#5U – MY04 – 12/13/12

PP#5D – MY04 – 12/13/12

PP#6U – MY04 – 12/13/12

PP#6D – MY04 – 12/13/12

PP#7 – MY04 – 12/13/12

PP#8U – MY04 – 12/13/12

PP#8D – MY04 – 12/13/12

PP#9U – MY04 – 12/13/12

PP#9D – MY04 – 12/13/12

PP#10U – MY04 – 12/13/12

PP#10D – MY04 – 12/13/12

PP#11 – MY04 – 12/13/12

PP#12U – MY04 – 12/13/12

PP#12D – MY04 – 12/13/12

PP#13U – MY04 – 12/13/12

PP#13D – MY04 – 12/13/12

PP#14U – MY04 – 12/13/12

PP#14D – MY04 – 12/13/12

PP#15U – MY04 – 12/13/12

PP#15D – MY04 – 12/13/12

PP#16U – MY04 – 12/13/12

PP#16D – MY04 – 12/13/12

PP#17U – MY04 – 12/13/12

PP#17D – MY04 – 12/13/12

PP#18U – MY04 – 12/13/12

PP#18D – MY04 – 12/13/12

PP#19U – MY04 – 12/13/12

PP#19D – MY04 – 12/13/12

PP#20U – MY04 – 12/13/12

PP#20D – MY04 – 12/13/12

PP#21U – MY04 – 12/13/12

PP#21D – MY04 – 12/13/12

PP#22U – MY04 – 12/13/12

PP#22D – MY04 – 12/13/12

PP#23U – MY04 – 12/13/12

PP#23D – MY04 – 12/13/12

PP#24U – MY04 – 12/13/12

PP#24D – MY04 – 12/13/12

PP#25 – MY04 – 12/13/12

PP#26U – MY04 – 12/13/12

PP#26D – MY04 – 12/13/12

PP#27UL – MY04 – 12/13/12

PP#27UR – MY04 – 12/13/12

PP#27D – MY04 – 12/13/12

PP#28U – MY04 – 12/13/12

PP#28D – MY04 – 12/13/12

PP#29U – MY04 – 12/13/12

PP#29D – MY04 – 12/13/12

PP#30UL – MY04 – 12/13/12

PP#30UR – MY04 – 12/13/12

PP#30D – MY04 – 12/13/12

PP#31U – MY04 – 12/13/12

PP#31D – MY04 – 12/13/12

PP#32U – MY04 – 12/13/12

PP#32D – MY04 – 12/13/12

PP#33U – MY04 – 12/13/12

PP#33D – MY04 – 12/13/12

PP#34U – MY04 – 12/13/12

PP#34D – MY04 – 12/13/12

PP#35U – MY04 – 12/13/12

PP#35D – MY04 – 12/13/12

PP#36U – MY04 – 12/13/12

PP#36D – MY04 – 12/13/12

PP#37U – MY04 – 12/13/12

PP#37D – MY04 – 12/13/12

PP#38U – MY04 – 12/13/12

PP#38D – MY04 – 12/13/12

PP#39U – MY04 – 12/13/12

PP#39D – MY04 – 12/13/12

PP#40U – MY04 – 12/13/12

PP#40D – MY04 – 12/13/12

PP#41U – MY04 – 12/13/12

PP#41D – MY04 – 12/13/12

PP#42D – MY04 – 12/13/12

PP#42U– MY04 – 12/13/12

PP#43U – MY04 – 12/13/12

PP#43D – MY04 – 12/13/12

PP#44U – MY04 – 12/13/12

PP#44D – MY04 – 12/13/12

PP#45U – MY04 – 12/13/12

PP#45D – MY04 – 12/13/12

PP#46 – MY04 – 12/13/12

PP#47 – MY04 – 12/13/12

PP#48U – MY04 – 12/13/12

PP#48D – MY04 – 12/13/12

PP#49U – MY04 – 12/13/12

PP#49D – MY04 – 12/13/12

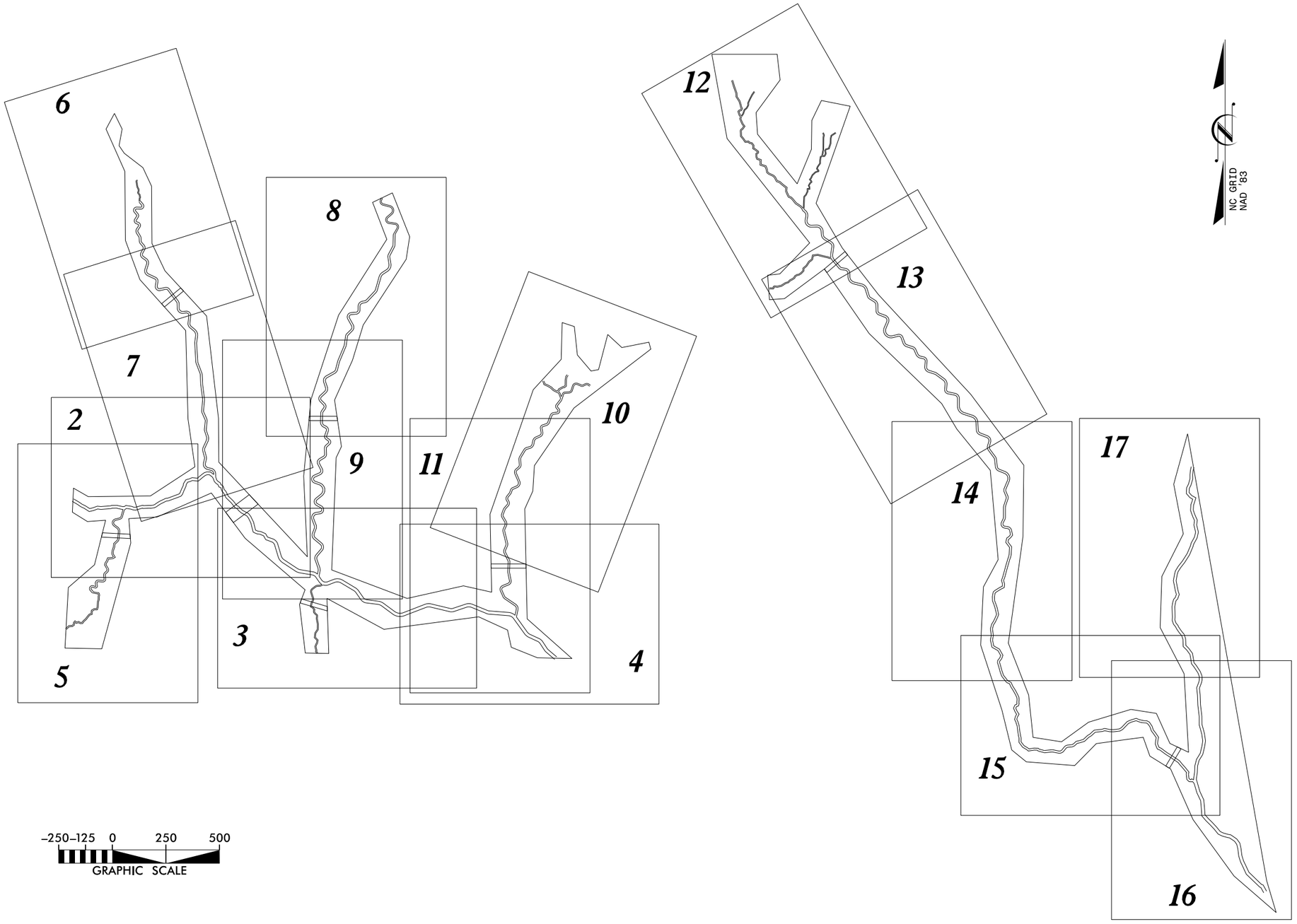
PP#50U – MY04 – 12/13/12

PP#50D – MY04 – 12/13/12

PP#51U – MY04 – 12/13/12

PP#51D – MY04 – 12/13/12

Appendix D
Current Condition Plan View



NC GRID
NAD '83

–250 –125 0 250 500
GRAPHIC SCALE

SYM.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

Ecosystem Enhancement Program

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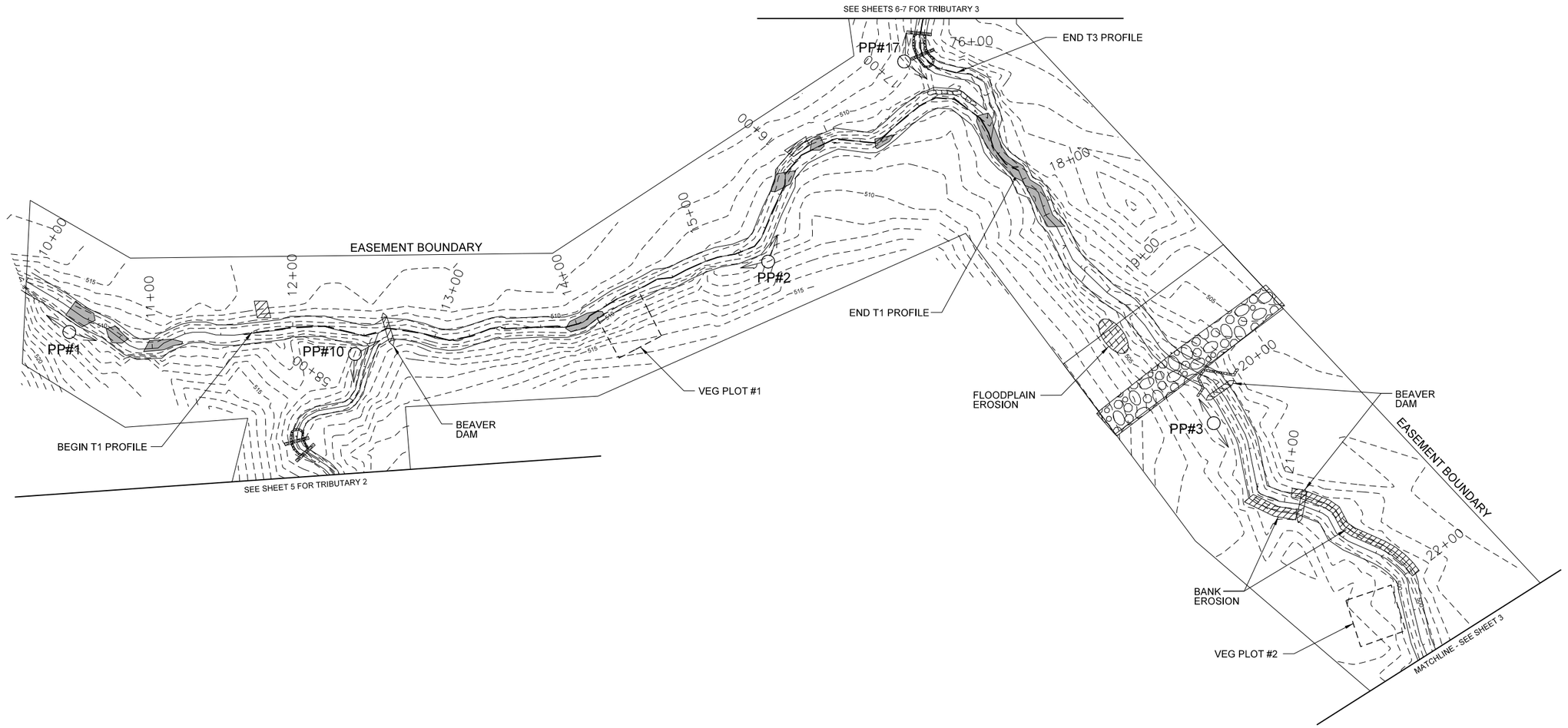
RALEIGH, NORTH CAROLINA 27609

CANE CREEK STREAM RESTORATION PROJECT

SEMORA, PERSON COUNTY, NORTH CAROLINA

DATE: DEC 2012
SCALE: 1"=500'

CURRENT CONDITION PLAN VIEW



NO.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

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CANE CREEK STREAM RESTORATION PROJECT

SEMORA, PERSON COUNTY, NORTH CAROLINA

T1-1, T1-2, T1-3: STATION 10+00 TO STATION 22+57

DATE: DEC 2012

SCALE: 1"=80'

CURRENT CONDITION PLAN VIEW

NO.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

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CANE CREEK STREAM RESTORATION PROJECT

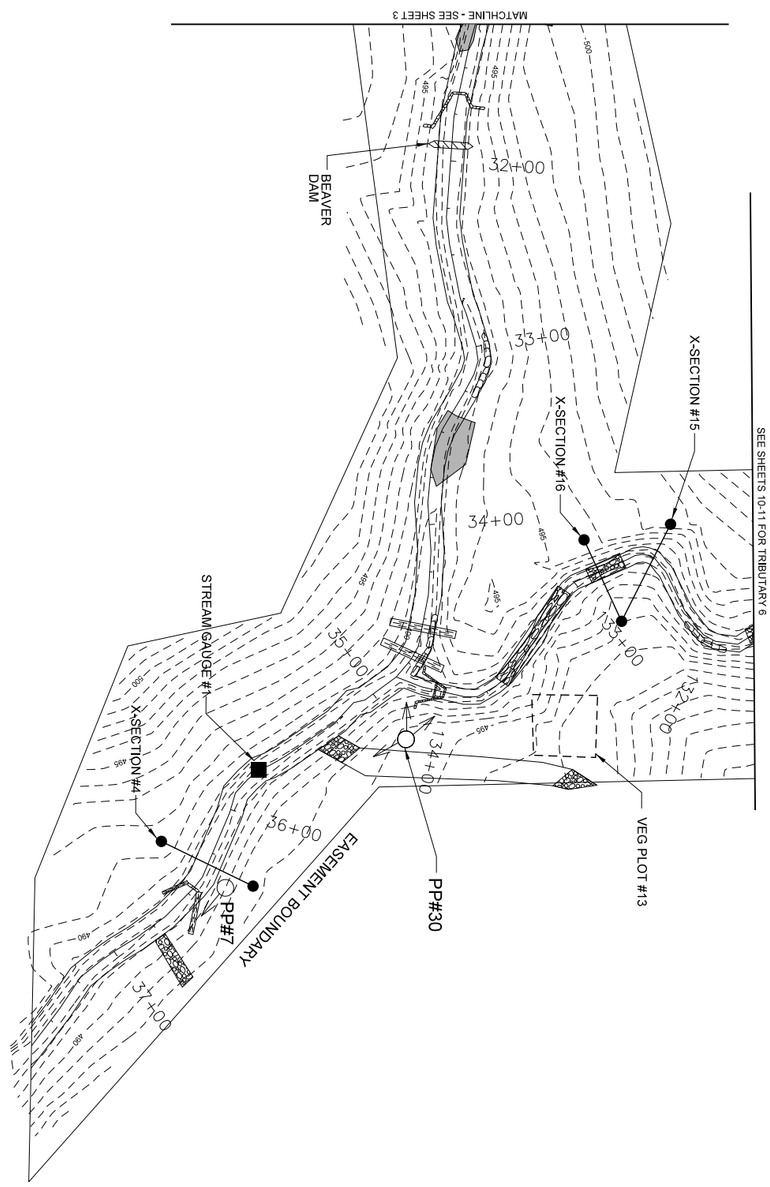
SEMORA, PERSON COUNTY, NORTH CAROLINA

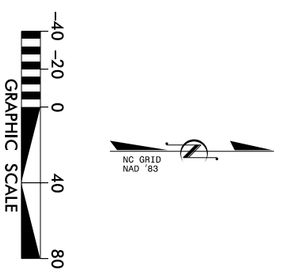
T1-3, T1-4, T5: STA 22+57 TO 31+26 AND STA 110+00 TO 113+95

DATE: DEC 2012

SCALE: 1"=80'

CURRENT CONDITION PLAN VIEW





CANE CREEK
STREAM RESTORATION PROJECT

SEMORA, PERSON COUNTY, NORTH CAROLINA

T1-4, T1-5: STATION 31+26 TO STATION 37+67

CURRENT CONDITION PLAN VIEW

SHEET 4 OF 17

DATE: DEC 2012
SCALE: 1"=80'

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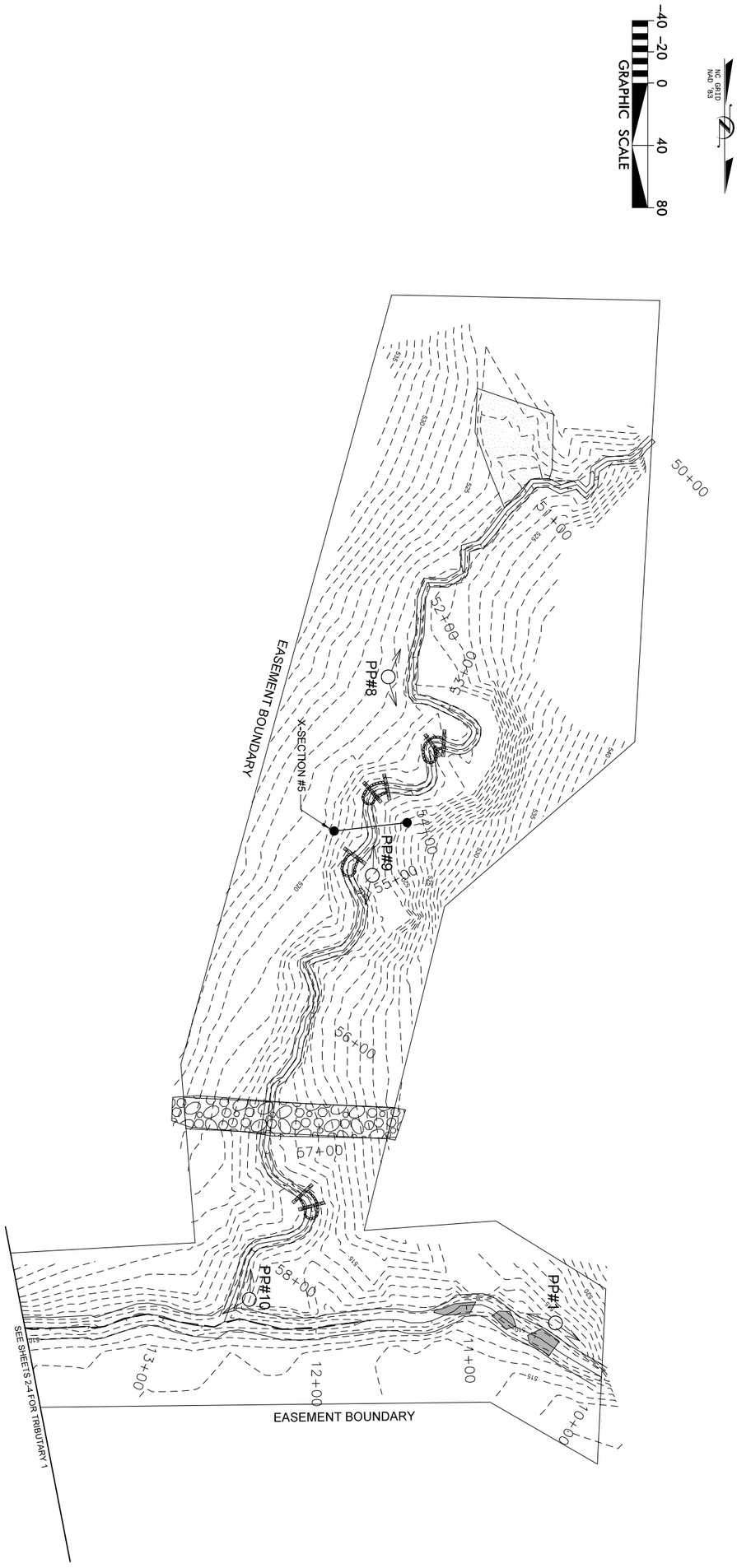
SYM.	DESCRIPTION	DATE	APPROVED
	REVISIONS		



SHEET 5 OF 17

CURRENT CONDITION PLAN VIEW

DATE: DEC 2012

SCALE: 1"=80'

CANE CREEK
STREAM RESTORATION PROJECT

SEMORA, PERSON COUNTY, NORTH CAROLINA

T2-1, T2-2, T2-3, T2-4: STATION 50+00 TO STATION 58+50

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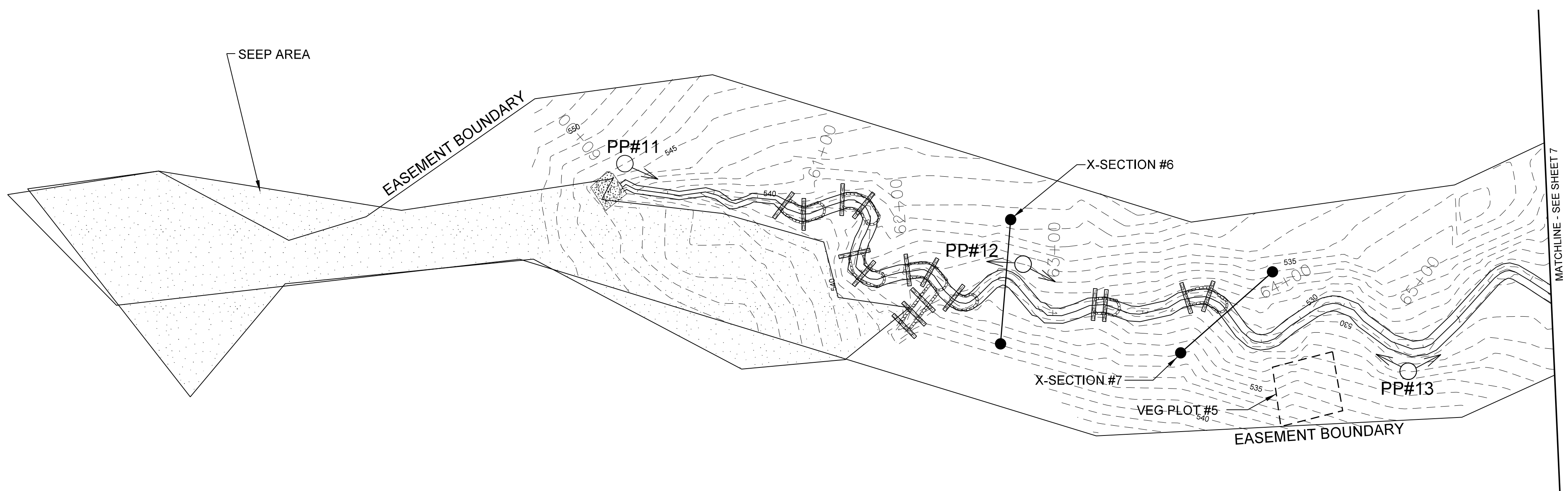
Ecosystem Enhancement Program

SYM.	DESCRIPTION	DATE	APPROVED
	REVISIONS		



NC GRID NAD '83

-40 -20 0 40 80
GRAPHIC SCALE

SYM.	DESCRIPTION	DATE	APPROVED

REVISIONS

Ecosystem Enhancement PROGRAM

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CANE CREEK
STREAM RESTORATION PROJECT

SEMORA, PERSON COUNTY, NORTH CAROLINA

T3-1, T3-2: STATION 60+00 TO STATION 66+13

DATE: DEC 2012
SCALE: 1"=80'

CURRENT CONDITIONS PLAN VIEW

SHEET 6 OF 17

NO.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

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CANE CREEK STREAM RESTORATION PROJECT

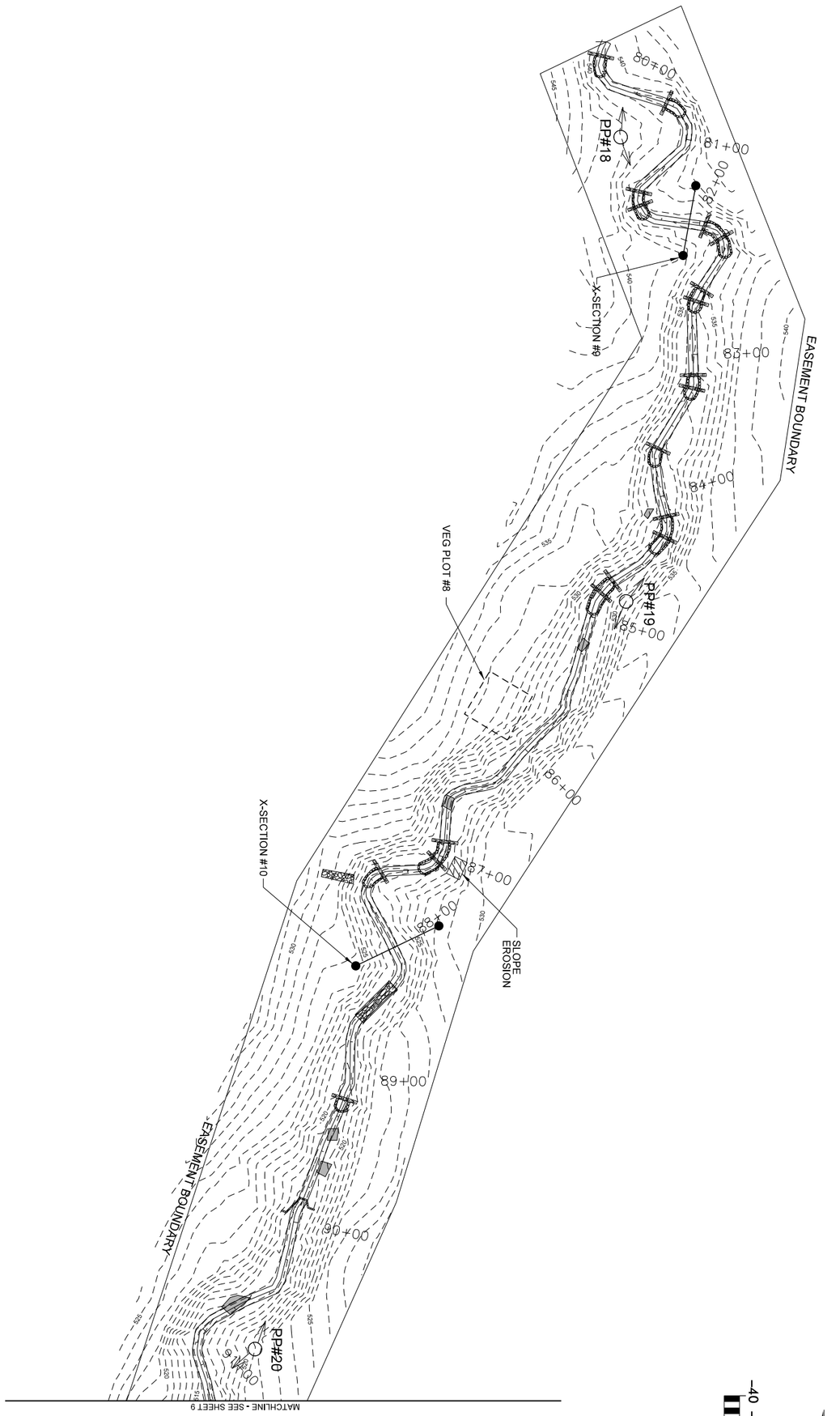
SEMORA, PERSON COUNTY, NORTH CAROLINA

T3-2: STATION 66+13 TO STATION 76+98

DATE: DEC 2012

SCALE: 1"=80'

CURRENT CONDITION PLAN VIEW



CURRENT CONDITION PLAN VIEW

SHEET 8 OF 17

DATE: DEC 2012
SCALE: 1"=80'

CANE CREEK
STREAM RESTORATION PROJECT

SEMORA, PERSON COUNTY, NORTH CAROLINA

T4-1, T4-2: STATION 80+00 TO STATION 91+49

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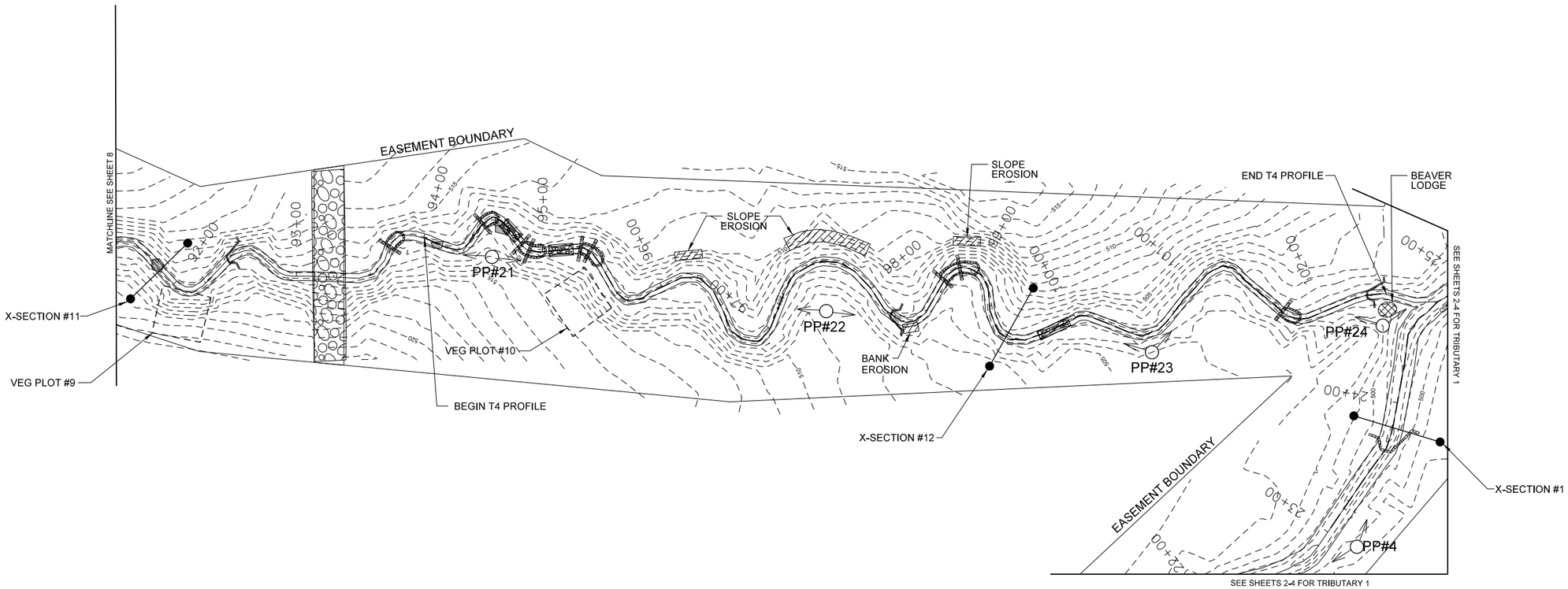
Ecosystem Enhancement PROGRAM

SYM.	DESCRIPTION	DATE	APPROVED
	REVISIONS		



NC GRID
NAD 83

–40 –20 0 40 80

GRAPHIC SCALE

NO.	DESCRIPTION	DATE	APPROVED

REVISIONS

Ecosystem Enhancement Program

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CANE CREEK STREAM RESTORATION PROJECT

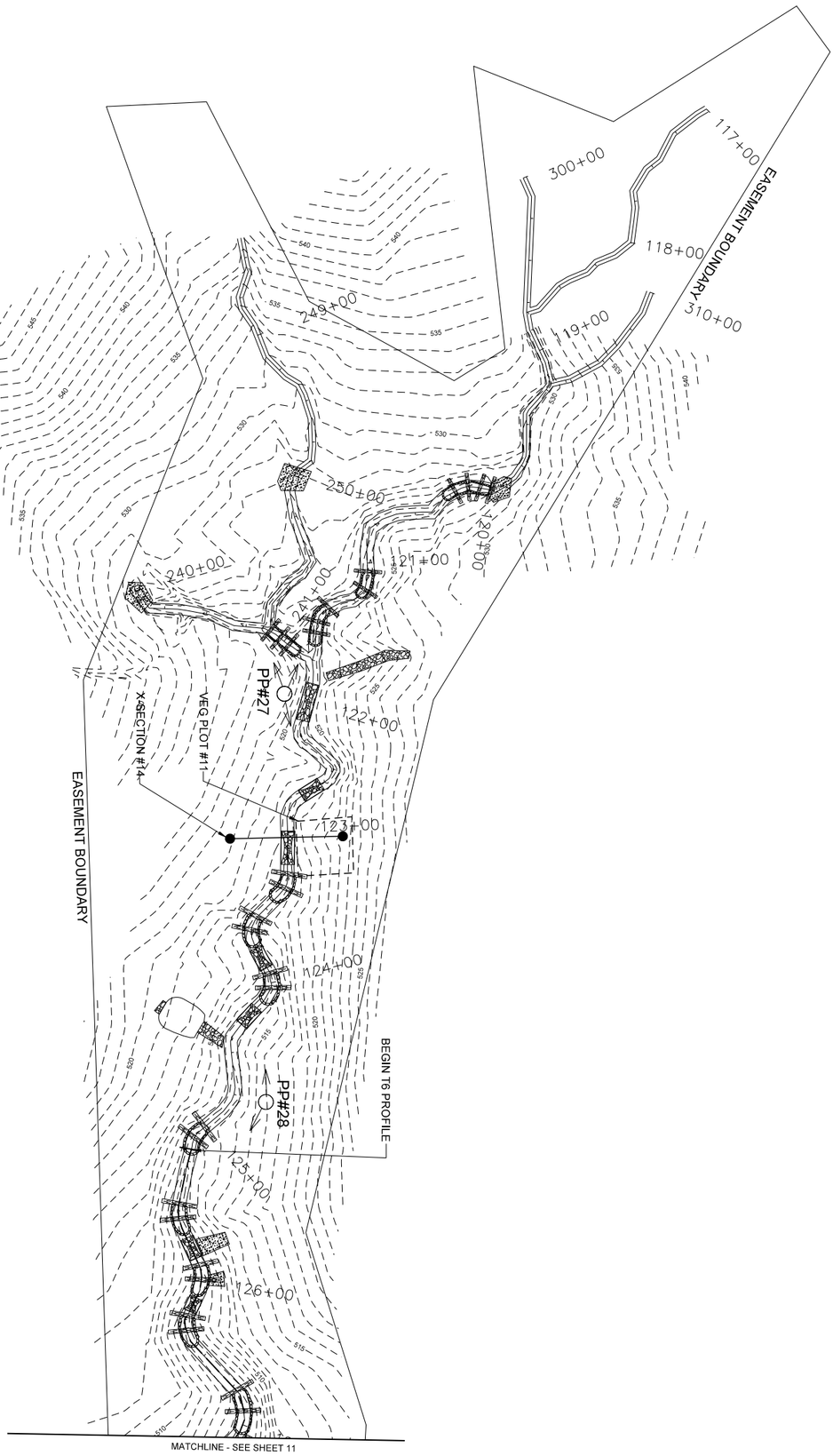
SEMORA, PERSON COUNTY, NORTH CAROLINA

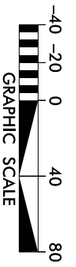
T4-2: STATION 91+49 TO STATION 102+81

DATE: DEC 2012

SCALE: 1"=80'

CURRENT CONDITION PLAN VIEW





SHEET 10 OF 17

CURRENT CONDITION PLAN VIEW

DATE: DEC 2012
SCALE: 1"=80'

CANE CREEK
STREAM RESTORATION PROJECT

SEMORA, PERSON COUNTY, NORTH CAROLINA

T6A, T6B, T6B-1, T6C-1, T6C-2, T6C-3, T6AB, T6C, T6:STA 300+00 TO 300+80, STA 310+00 TO 310+82, STA 240+00 TO 241+21, STA 248+38 TO 251+04, AND STA 117+02 TO 127+10

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Ecosystem Enhancement Program

SYM.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

REVISIONS

SYM.	DESCRIPTION	DATE	APPROVED

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CANE CREEK
STREAM RESTORATION PROJECT
SEMORA, PERSON COUNTY, NORTH CAROLINA
T6: STATION 127+10 TO STATION 134+25

DATE: DEC 2012
SCALE: 1"=80'

CURRENT CONDITION PLAN VIEW

SHEET 11 OF 17

CANE CREEK
STREAM RESTORATION PROJECT
SEMORA, PERSON COUNTY, NORTH CAROLINA

T7A, T7A-1, T7B, T7C, T7-1, T7-2, T7-3, T8, T8A, T8A-1, T8-1, T8B, T9:
STA 260+00 TO 261+36, STA 140+00 TO 151+57, STA 270+00 TO 271+23,
STA 200+00 TO 204+38, AND STA 210+00 TO 213+68

CURRENT CONDITION PLAN VIEW

SHEET 12 OF 17

DATE: DEC 2012
SCALE: 1"=80'

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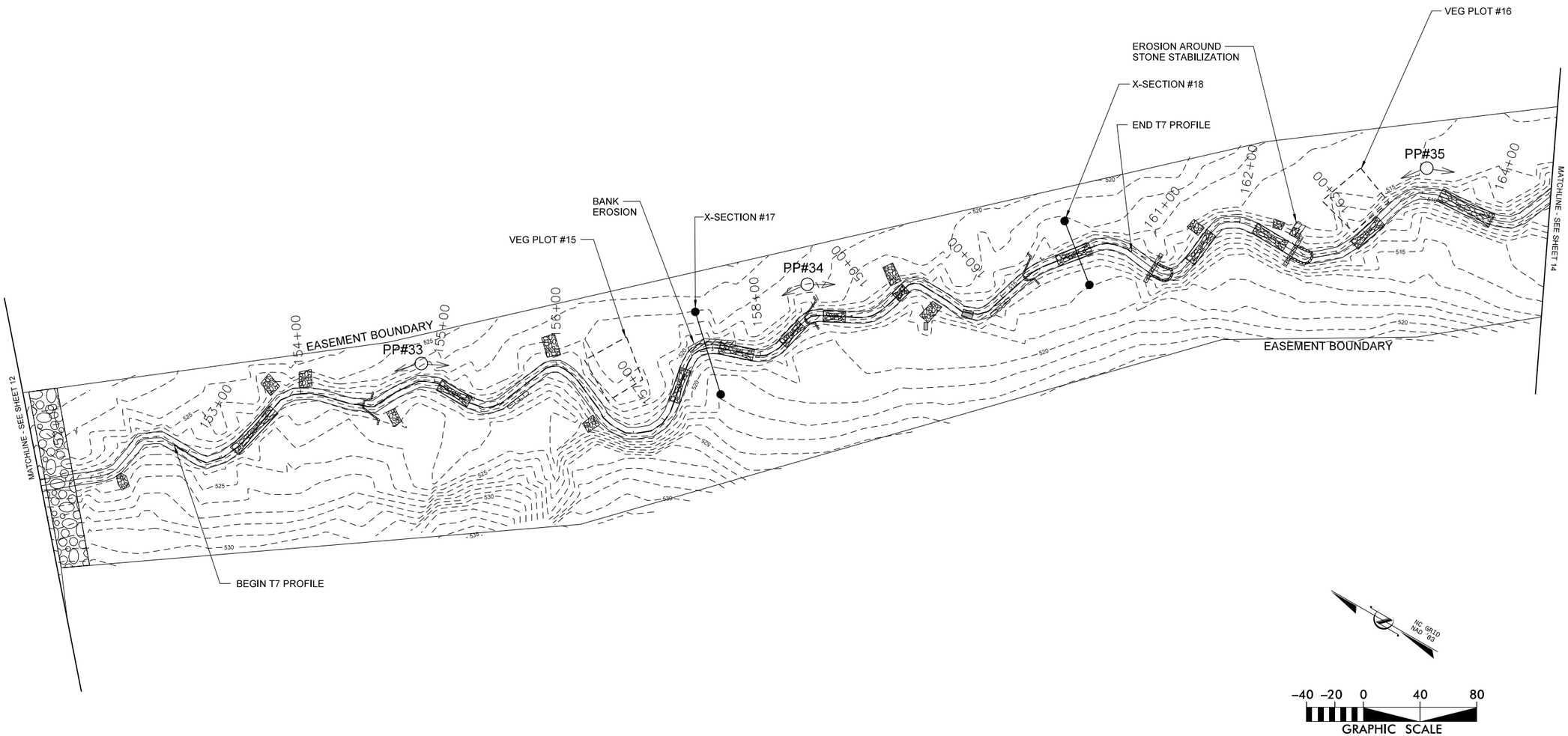
Ecosystem Enhancement Program

SYM.	DESCRIPTION	DATE	APPROVED
	REVISIONS		



REVISIONS

SYM.	DESCRIPTION	DATE	APPROVED

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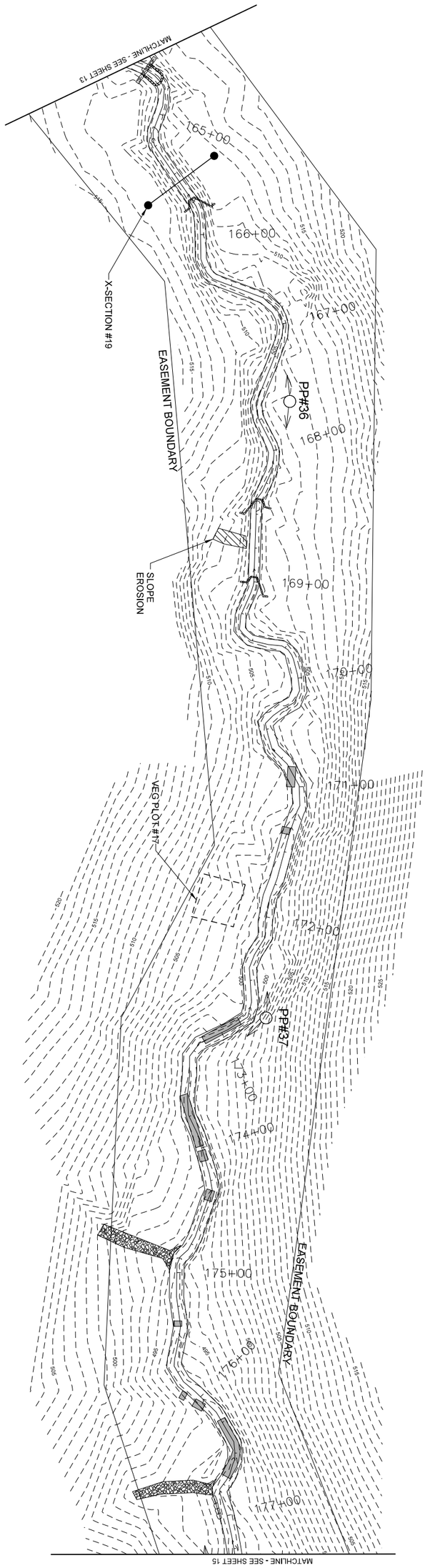
CANE CREEK STREAM RESTORATION PROJECT

SEMORA, PERSON COUNTY, NORTH CAROLINA

T7-3: STATION 151+57 TO STATION 164+50

DATE: DEC 2012
SCALE: 1"=80'

CURRENT CONDITION PLAN VIEW



GRAPHIC SCALE
-40 -20 0 40 80

NC GRID NAD 83

SHEET 14 OF 17

CURRENT CONDITION PLAN VIEW

DATE: DEC 2012
SCALE: 1"=80'

CANE CREEK STREAM RESTORATION PROJECT

SEMORA, PERSON COUNTY, NORTH CAROLINA

T7-3, T7-4: STATION 16+50 TO STATION 177+29

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Ecosystem Enhancement Program

SYM.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

MATCHLINE - SEE SHEET 14

PP#38

BEGIN T7 PROFILE 2

EASEMENT BOUNDARY

END T7 PROFILE 2

PP#41

PP#40

VEG PLOT #18

STREAM GAUGE #2

X-SECTION #20

PP#39

BANK EROSION

EASEMENT BOUNDARY

MATCHLINE - SEE SHEET 16

NC GRID
NAD '83

–40 –20 0 40 80

GRAPHIC SCALE

NO.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

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CANE CREEK
STREAM RESTORATION PROJECT

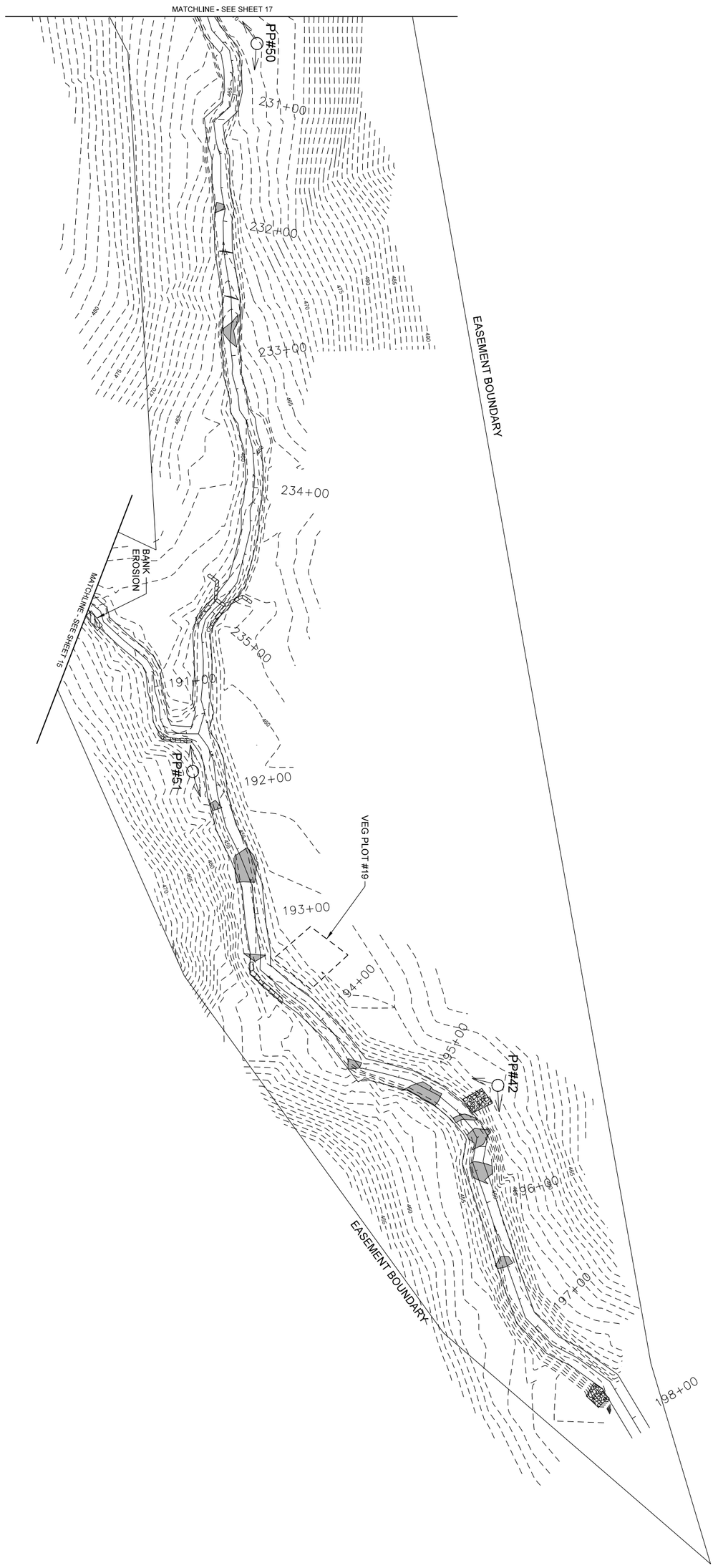
SEMORA, PERSON COUNTY, NORTH CAROLINA

T7-4, T7-5, T7-6: STATION 177+29 TO STATION 190+18

DATE: DEC 2012

SCALE: 1"=80'

CURRENT
CONDITION
PLAN VIEW



CURRENT CONDITION PLAN VIEW

SHEET 16 OF 17

DATE: DEC 2012

SCALE: 1"=80'

CANE CREEK
STREAM RESTORATION PROJECT

SEMORA, PERSON COUNTY, NORTH CAROLINA

T7-6, T7-7, AND T10: STA 190+18 TO 198+13
AND STA 230+37 TO 235+91

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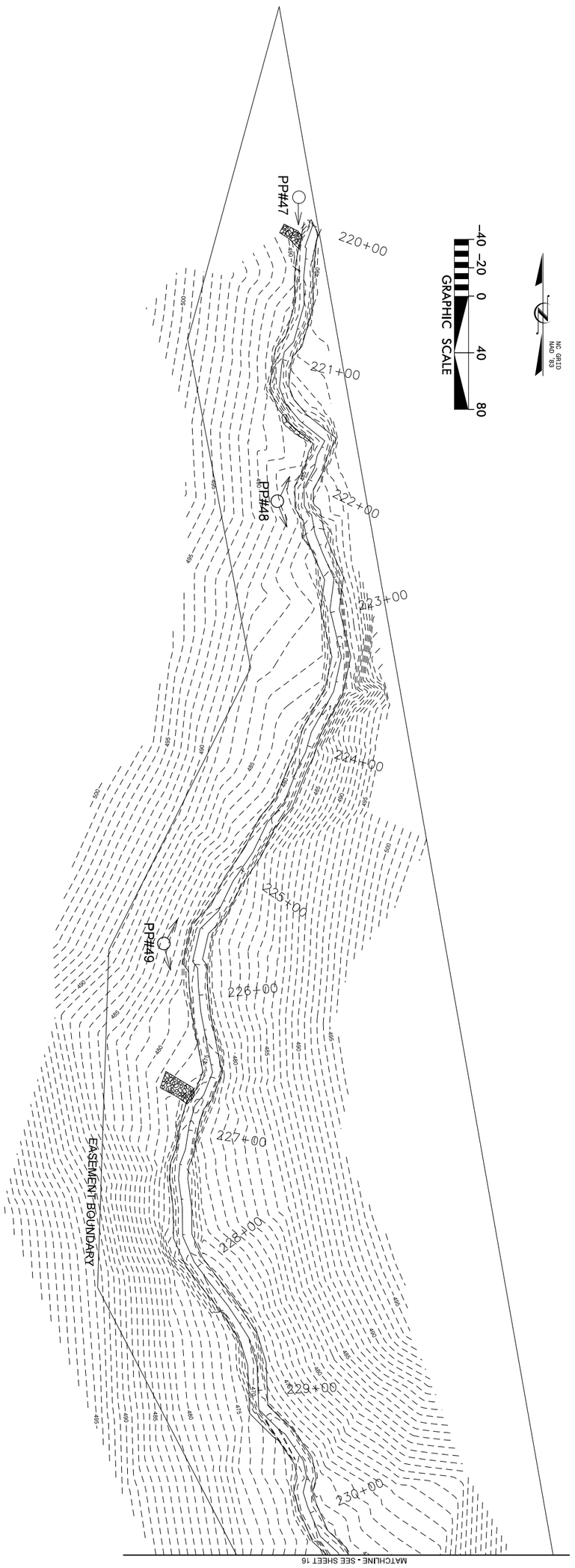
Ecosystem Enhancement Program

SYM.	DESCRIPTION	DATE	APPROVED

REVISIONS



CURRENT CONDITION PLAN VIEW

SHEET 17 OF 17

DATE: DEC 2012
SCALE: 1"=80'

CANE CREEK STREAM RESTORATION PROJECT

SEMORA, PERSON COUNTY, NORTH CAROLINA

T10: STATION 220+00 TO STATION 230+37

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SYM.	DESCRIPTION	DATE	APPROVED
	REVISIONS		